

NOTE-BOOK

Entomology

Insect nutriment = 1 隻の microorganism, 1 斗用 = 就 1 斗用

Wollman 1911 } microorganisms unnecessary
Loeb 1915 }

Loehr + Northrop 1916	Drosophila	yeast with
Northrop 1917	"	yeast (vitamine?)
Atkin and Bacot 1917	mosquito	yeast + bacteria
Baumberger 1919	Drosophila ^{ex}	yeast
Cleveland 1924	Termite ^{Diptera}	protozoa (Symbiosis)


Apparent food - real food.

○ ついで、食果の昆虫、食物、見かけ、食物、排泄物、異つ。例へば腐蝕物、腐肉
ヲ食フテ ^ル 糞 = 見ては昆虫ハ リル ~~ミ~~ テ食フ、テヤ。Q. 20 = ついで microorganism
又ハ 排泄物 product ヲ食フト。(Baumberger: J. Expt. Zool. 28: 1-81)
Cleaveland, 30 頁 "American Naturalist." 46.

多くの昆虫は、食物を探し見つけてくる。が、或は、昆虫は、自ら自ら、foodを提供する。

1). gall. 蜂虫, 介壳物, 栎瘿 = 10 枝, 5 个第, 22 音 + 2 儿 + 音 + 7.
-makers.

2). Fungus-grower びんてい bihi / shore ヲトリテ ●キテ 集、中 = 水田ヲノコシテ。 "ウナ
 菌糸ハミテ (sporangium etc) 食フ

3). Regurgitated food. - 一口の食物をエサとして吐き出す。吐いたものは、
= 食料。例 / 

4). *milker*. 乳牛人 乳牛 / 飼育. 冬 = \pm 乳牛 / 飼育 (卵) 卵 / 乳牛 = 乳牛 / 飼育.

food habits

貨物性 / elasticity. 20. economically = 意味 74. 外國の事は 意味 75. 21

elasticity, 弾性力 成り上.
life history 生命史

1) ontogenetic + 胚. 幼虫, 成虫, 有翅, 異性胚. *Lepidosteus*, 鱈魚.

phytophugus 植物食性. 食. 更 = 異. 7. 7. 1. 1. Syrphus 7. 7. 1. 1. parasite = 寄生性.

幼虫の成虫 = +41" 331" 食ヲトシテ (parasitic Hymenoptera). 又. 11.14.191

Tenthredo " imago " predaceous 5". 2 Ephemerida 9" imago = 17715

總計 = 食 + 衣

Feb. 2 20

27 sex = 21 $\frac{3}{2}$ 721. mosquito. ♂ plant juice. ♀ animal blood.

同に50Xでアリ+カシ 果の割合が7割程度。

Systellonotus tringitatus (Miridae)

主 1 7 11 8 ... 植物性

$$L_{k+1} = 1 \quad \dots \quad \mathcal{L}_k = \text{the (anti-mimic) } \mathcal{L}_k \text{ (e.g., } \mathcal{L}_k = \{1, 2, \dots, k\})$$

3). season = 季節 異なり。 春から秋にかけて peak になる。
season が (昔に) なし、実 = 入る。 又 aphid 中 = seasonal migration
あり。 ウィンター期間、越冬、カハルモイロ。

4) ecological difference. environment, change 2. + 3. 1. 7n 3 + 1. 7n
食性、かん毛。 2. 1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78. 79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94. 95. 96. 97. 98. 99. 100. 101. 102. 103. 104. 105. 106. 107. 108. 109. 110. 111. 112. 113. 114. 115. 116. 117. 118. 119. 120. 121. 122. 123. 124. 125. 126. 127. 128. 129. 130. 131. 132. 133. 134. 135. 136. 137. 138. 139. 140. 141. 142. 143. 144. 145. 146. 147. 148. 149. 150. 151. 152. 153. 154. 155. 156. 157. 158. 159. 160. 161. 162. 163. 164. 165. 166. 167. 168. 169. 170. 171. 172. 173. 174. 175. 176. 177. 178. 179. 180. 181. 182. 183. 184. 185. 186. 187. 188. 189. 190. 191. 192. 193. 194. 195. 196. 197. 198. 199. 200. 201. 202. 203. 204. 205. 206. 207. 208. 209. 210. 211. 212. 213. 214. 215. 216. 217. 218. 219. 220. 221. 222. 223. 224. 225. 226. 227. 228. 229. 230. 231. 232. 233. 234. 235. 236. 237. 238. 239. 240. 241. 242. 243. 244. 245. 246. 247. 248. 249. 250. 251. 252. 253. 254. 255. 256. 257. 258. 259. 260. 261. 262. 263. 264. 265. 266. 267. 268. 269. 270. 271. 272. 273. 274. 275. 276. 277. 278. 279. 280. 281. 282. 283. 284. 285. 286. 287. 288. 289. 290. 291. 292. 293. 294. 295. 296. 297. 298. 299. 300. 301. 302. 303. 304. 305. 306. 307. 308. 309. 310. 311. 312. 313. 314. 315. 316. 317. 318. 319. 320. 321. 322. 323. 324. 325. 326. 327. 328. 329. 330. 331. 332. 333. 334. 335. 336. 337. 338. 339. 340. 341. 342. 343. 344. 345. 346. 347. 348. 349. 350. 351. 352. 353. 354. 355. 356. 357. 358. 359. 360. 361. 362. 363. 364. 365. 366. 367. 368. 369. 370. 371. 372. 373. 374. 375. 376. 377. 378. 379. 380. 381. 382. 383. 384. 385. 386. 387. 388. 389. 390. 391. 392. 393. 394. 395. 396. 397. 398. 399. 400. 401. 402. 403. 404. 405. 406. 407. 408. 409. 410. 411. 412. 413. 414. 415. 416. 417. 418. 419. 420. 421. 422. 423. 424. 425. 426. 427. 428. 429. 430. 431. 432. 433. 434. 435. 436. 437. 438. 439. 440. 441. 442. 443. 444. 445. 446. 447. 448. 449. 450. 451. 452. 453. 454. 455. 456. 457. 458. 459. 460. 461. 462. 463. 464. 465. 466. 467. 468. 469. 470. 471. 472. 473. 474. 475. 476. 477. 478. 479. 480. 481. 482. 483. 484. 485. 486. 487. 488. 489. 490. 491. 492. 493. 494. 495. 496. 497. 498. 499. 500. 501. 502. 503. 504. 505. 506. 507. 508. 509. 510. 511. 512. 513. 514. 515. 516. 517. 518. 519. 520. 521. 522. 523. 524. 525. 526. 527. 528. 529. 530. 531. 532. 533. 534. 535. 536. 537. 538. 539. 540. 541. 542. 543. 544. 545. 546. 547. 548. 549. 550. 551. 552. 553. 554. 555. 556. 557. 558. 559. 560. 561. 562. 563. 564. 565. 566. 567. 568. 569. 570. 571. 572. 573. 574. 575. 576. 577. 578. 579. 580. 581. 582. 583. 584. 585. 586. 587. 588. 589. 590. 591. 592. 593. 594. 595. 596. 597. 598. 599. 600. 601. 602. 603. 604. 605. 606. 607. 608. 609. 610. 611. 612. 613. 614. 615. 616. 617. 618. 619. 620. 621. 622. 623. 624. 625. 626. 627. 628. 629. 630. 631. 632. 633. 634. 635. 636. 637. 638. 639. 640. 641. 642. 643. 644. 645. 646. 647. 648. 649. 650. 651. 652. 653. 654. 655. 656. 657. 658. 659. 660. 661. 662. 663. 664. 665. 666. 667. 668. 669. 670. 671. 672. 673. 674. 675. 676. 677. 678. 679. 680. 681. 682. 683. 684. 685. 686. 687. 688. 689. 690. 691. 692. 693. 694. 695. 696. 697. 698. 699. 700. 701. 702. 703. 704. 705. 706. 707. 708. 709. 710. 711. 712. 713. 714. 715. 716. 717. 718. 719. 720. 721. 722. 723. 724. 725. 726. 727. 728. 729. 730. 731. 732. 733. 734. 735. 736. 737. 738. 739. 740. 741. 742. 743. 744. 745. 746. 747. 748. 749. 750. 751. 752. 753. 754. 755. 756. 757. 758. 759. 760. 761. 762. 763. 764. 765. 766. 767. 768. 769. 770. 771. 772. 773. 774. 775. 776. 777. 778. 779. 780. 781. 782. 783. 784. 785. 786. 787. 788. 789. 790. 791. 792. 793. 794. 795. 796. 797. 798. 799. 800. 801. 802. 803. 804. 805. 806. 807. 808. 809. 810. 811. 812. 813. 814. 815. 816. 817. 818. 819. 820. 821. 822. 823. 824. 825. 826. 827. 828. 829. 830. 831. 832.

白蟻ハ、hatal 地方ニ於テマクワ+イヌ、香+梅+ハ、皆桃ノ木ヲ用ヒテ中ニ、

Securing of food & maternal instinct

成虫の食性は Trophomiza と habitat, 他生物に一切 = 食しない。

幼虫 = 上口型, 雌性, 产卵, 本能产卵; 早幼虫, 食物上产卵, 又, 也是产卵

Shelford 1909, 1372-4. *Cicindella hirticollis* ♂ oviposition = etc

	Soil (3 1/2%)	sand	soil 3 parts humus 1 pt.	humus	clay
1.	no. holes made	13+	10	3	0
	no. eggs laid	13	10	0	0
2.	no. holes made	15	24	1	2
	no. eggs laid	15	11	1	0
Total		28+	34	4	2
		28	21	1	0

1.

s	h+s
h	c

2.

h	c
s	hts

reference. Kopeć 1924. Biol. Bull. XLVI: 1-21, 22-23.

昆虫が植物を食するの利害の効果を effect of feed of plant.

- 1. 形質的 / 被害. 直接 = destruction of plant substance である. 幹, 根, 葉, 花
- 2. 生理的 or functional 被害. 主 = 間接被害. 同化, 養分, 繁殖. 生理的 + vital part of plant life である.
- 3. 病現的 被害. a. 病徴を起す - 病徴, 病徴, 病徴, 被害. b. abnormality 起す - insect gall, 木を食する (12-13-14-15-16-17-18-19-20-21-22-23-24-25-26-27-28-29-30-31-32-33-34-35-36-37-38-39-40-41-42-43-44-45-46-47-48-49-50-51-52-53-54-55-56-57-58-59-60-61-62-63-64-65-66-67-68-69-70-71-72-73-74-75-76-77-78-79-80-81-82-83-84-85-86-87-88-89-90-91-92-93-94-95-96-97-98-99-100-101-102-103-104-105-106-107-108-109-110-111-112-113-114-115-116-117-118-119-120-121-122-123-124-125-126-127-128-129-130-131-132-133-134-135-136-137-138-139-140-141-142-143-144-145-146-147-148-149-150-151-152-153-154-155-156-157-158-159-160-161-162-163-164-165-166-167-168-169-170-171-172-173-174-175-176-177-178-179-180-181-182-183-184-185-186-187-188-189-190-191-192-193-194-195-196-197-198-199-200-201-202-203-204-205-206-207-208-209-210-211-212-213-214-215-216-217-218-219-220-221-222-223-224-225-226-227-228-229-230-231-232-233-234-235-236-237-238-239-240-241-242-243-244-245-246-247-248-249-250-251-252-253-254-255-256-257-258-259-260-261-262-263-264-265-266-267-268-269-270-271-272-273-274-275-276-277-278-279-280-281-282-283-284-285-286-287-288-289-290-291-292-293-294-295-296-297-298-299-300-301-302-303-304-305-306-307-308-309-310-311-312-313-314-315-316-317-318-319-320-321-322-323-324-325-326-327-328-329-330-331-332-333-334-335-336-337-338-339-340-341-342-343-344-345-346-347-348-349-350-351-352-353-354-355-356-357-358-359-360-361-362-363-364-365-366-367-368-369-370-371-372-373-374-375-376-377-378-379-380-381-382-383-384-385-386-387-388-389-390-391-392-393-394-395-396-397-398-399-400-401-402-403-404-405-406-407-408-409-410-411-412-413-414-415-416-417-418-419-420-421-422-423-424-425-426-427-428-429-430-431-432-433-434-435-436-437-438-439-440-441-442-443-444-445-446-447-448-449-450-451-452-453-454-455-456-457-458-459-460-461-462-463-464-465-466-467-468-469-470-471-472-473-474-475-476-477-478-479-480-481-482-483-484-485-486-487-488-489-490-491-492-493-494-495-496-497-498-499-500-501-502-503-504-505-506-507-508-509-510-511-512-513-514-515-516-517-518-519-520-521-522-523-524-525-526-527-528-529-530-531-532-533-534-535-536-537-538-539-540-541-542-543-544-545-546-547-548-549-550-551-552-553-554-555-556-557-558-559-560-561-562-563-564-565-566-567-568-569-570-571-572-573-574-575-576-577-578-579-580-581-582-583-584-585-586-587-588-589-590-591-592-593-594-595-596-597-598-599-600-601-602-603-604-605-606-607-608-609-610-611-612-613-614-615-616-617-618-619-620-621-622-623-624-625-626-627-628-629-630-631-632-633-634-635-636-637-638-639-640-641-642-643-644-645-646-647-648-649-650-651-652-653-654-655-656-657-658-659-660-661-662-663-664-665-666-667-668-669-670-671-672-673-674-675-676-677-678-679-680-681-682-683-684-685-686-687-688-689-690-691-692-693-694-695-696-697-698-699-700-701-702-703-704-705-706-707-708-709-710-711-712-713-714-715-716-717-718-719-720-721-722-723-724-725-726-727-728-729-730-731-732-733-734-735-736-737-738-739-740-741-742-743-744-745-746-747-748-749-750-751-752-753-754-755-756-757-758-759-760-761-762-763-764-765-766-767-768-769-770-771-772-773-774-775-776-777-778-779-780-781-782-783-784-785-786-787-788-789-790-791-792-793-794-795-796-797-798-799-800-801-802-803-804-805-806-807-808-809-810-811-812-813-814-815-816-817-818-819-820-821-822-823-824-825-826-827-828-829-830-831-832-833-834-835-836-837-838-839-840-841-842-843-844-845-846-847-848-849-850-851-852-853-854-855-856-857-858-859-860-861-862-863-864-865-866-867-868-869-870-871-872-873-874-875-876-877-878-879-880-881-882-883-884-885-886-887-888-889-890-891-892-893-894-895-896-897-898-899-900-901-902-903-904-905-906-907-908-909-910-911-912-913-914-915-916-917-918-919-920-921-922-923-924-925-926-927-928-929-930-931-932-933-934-935-936-937-938-939-940-941-942-943-944-945-946-947-948-949-950-951-952-953-954-955-956-957-958-959-960-961-962-963-964-965-966-967-968-969-970-971-972-973-974-975-976-977-978-979-980-981-982-983-984-985-986-987-988-989-990-991-992-993-994-995-996-997-998-999-1000-1001-1002-1003-1004-1005-1006-1007-1008-1009-1010-1011-1012-1013-1014-1015-1016-1017-1018-1019-1020-1021-1022-1023-1024-1025-1026-1027-1028-1029-1030-1031-1032-1033-1034-1035-1036-1037-1038-1039-1040-1041-1042-1043-1044-1045-1046-1047-1048-1049-1050-1051-1052-1053-1054-1055-1056-1057-1058-1059-1060-1061-1062-1063-1064-1065-1066-1067-1068-1069-1070-1071-1072-1073-1074-1075-1076-1077-1078-1079-1080-1081-1082-1083-1084-1085-1086-1087-1088-1089-1090-1091-1092-1093-1094-1095-1096-1097-1098-1099-1100-1101-1102-1103-1104-1105-1106-1107-1108-1109-1110-1111-1112-1113-1114-1115-1116-1117-1118-1119-1120-1121-1122-1123-1124-1125-1126-1127-1128-1129-1130-1131-1132-1133-1134-1135-1136-1137-1138-1139-1140-1141-1142-1143-1144-1145-1146-1147-1148-1149-1150-1151-1152-1153-1154-1155-1156-1157-1158-1159-1160-1161-1162-1163-1164-1165-1166-1167-1168-1169-1170-1171-1172-1173-1174-1175-1176-1177-1178-1179-1180-1181-1182-1183-1184-1185-1186-1187-1188-1189-1190-1191-1192-1193-1194-1195-1196-1197-1198-1199-1200-1201-1202-1203-1204-1205-1206-1207-1208-1209-1210-1211-1212-1213-1214-1215-1216-1217-1218-1219-1220-1221-1222-1223-1224-1225-1226-1227-1228-1229-1230-1231-1232-1233-1234-1235-1236-1237-1238-1239-1240-1241-1242-1243-1244-1245-1246-1247-1248-1249-1250-1251-1252-1253-1254-1255-1256-1257-1258-1259-1260-1261-1262-1263-1264-1265-1266-1267-1268-1269-1270-1271-1272-1273-1274-1275-1276-1277-1278-1279-1280-1281-1282-1283-1284-1285-1286-1287-1288-1289-1290-1291-1292-1293-1294-1295-1296-1297-1298-1299-1300-1301-1302-1303-1304-1305-1306-1307-1308-1309-1310-1311-1312-1313-1314-1315-1316-1317-1318-1319-1320-1321-1322-1323-1324-1325-1326-1327-1328-1329-1330-1331-1332-1333-1334-1335-1336-1337-1338-1339-1340-1341-1342-1343-1344-1345-1346-1347-1348-1349-1350-1351-1352-1353-1354-1355-1356-1357-1358-1359-1360-1361-1362-1363-1364-1365-1366-1367-1368-1369-1370-1371-1372-1373-1374-1375-1376-1377-1378-1379-1380-1381-1382-1383-1384-1385-1386-1387-1388-1389-1390-1391-1392-1393-1394-1395-1396-1397-1398-1399-1400-1401-1402-1403-1404-1405-1406-1407-1408-1409-1410-1411-1412-1413-1414-1415-1416-1417-1418-1419-1420-1421-1422-1423-1424-1425-1426-1427-1428-1429-1430-1431-1432-1433-1434-1435-1436-1437-1438-1439-1440-1441-1442-1443-1444-1445-1446-1447-1448-1449-1450-1451-1452-1453-1454-1455-1456-1457-1458-1459-1460-1461-1462-1463-1464-1465-1466-1467-1468-1469-1470-1471-1472-1473-1474-1475-1476-1477-1478-1479-1480-1481-1482-1483-1484-1485-1486-1487-1488-1489-1490-1491-1492-1493-1494-1495-1496-1497-1498-1499-1500-1501-1502-1503-1504-1505-1506-1507-1508-1509-1510-1511-1512-1513-1514-1515-1516-1517-1518-1519-1520-1521-1522-1523-1524-1525-1526-1527-1528-1529-1530-1531-1532-1533-1534-1535-1536-1537-1538-1539-1540-1541-1542-1543-1544-1545-1546-1547-1548-1549-1550-1551-1552-1553-1554-1555-1556-1557-1558-1559-1560-1561-1562-1563-1564-1565-1566-1567-1568-1569-1570-1571-1572-1573-1574-1575-1576-1577-1578-1579-1580-1581-1582-1583-1584-1585-1586-1587-1588-1589-1590-1591-1592-1593-1594-1595-1596-1597-1598-1599-1600-1601-1602-1603-1604-1605-1606-1607-1608-1609-1610-1611-1612-1613-1614-1615-1616-1617-1618-1619-1620-1621-1622-1623-1624-1625-1626-1627-1628-1629-1630-1631-1632-1633-1634-1635-1636-1637-1638-1639-1640-1641-1642-1643-1644-1645-1646-1647-1648-1649-1650-1651-1652-1653-1654-1655-1656-1657-1658-1659-1660-1661-1662-1663-1664-1665-1666-1667-1668-1669-1670-1671-1672-1673-1674-1675-1676-1677-1678-1679-1680-1681-1682-1683-1684-1685-1686-1687-1688-1689-1690-1691-1692-1693-1694-1695-1696-1697-1698-1699-1700-1701-1702-1703-1704-1705-1706-1707-1708-1709-1710-1711-1712-1713-1714-1715-1716-1717-1718-1719-1720-1721-1722-1723-1724-1725-1726-1727-1728-1729-1730-1731-1732-1733-1734-1735-1736-1737-1738-1739-1740-1741-1742-1743-1744-1745-1746-1747-1748-1749-1750-1751-1752-1753-1754-1755-1756-1757-1758-1759-1760-1761-1762-1763-1764-1765-1766-1767-1768-1769-1770-1771-1772-1773-1774-1775-1776-1777-1778-1779-1780-1781-1782-1783-1784-1785-1786-1787-1788-1789-1790-1791-1792-1793-1794-1795-1796-1797-1798-1799-1800-1801-1802-1803-1804-1805-1806-1807-1808-1809-1810-1811-1812-1813-1814-1815-1816-1817-1818-1819-1820-1821-1822-1823-1824-1825-1826-1827-1828-1829-1830-1831-1832-1833-1834-1835-1836-1837-1838-1839-1840-1841-1842-1843-1844-1845-1846-1847-1848-1849-1850-1851-1852-1853-1854-1855-1856-1857-1858-1859-1860-1861-1862-1863-1864-1865-1866-1867-1868-1869-1870-1871-1872-1873-1874-1875-1876-1877-1878-1879-1880-1881-1882-1883-1884-1885-1886-1887-1888-1889-1890-1891-1892-1893-1894-1895-1896-1897-1898-1899-1900-1901-1902-1903-1904-1905-1906-1907-1908-1909-1910-1911-1912-1913-1914-1915-1916-1917-1918-1919-1920-1921-1922-1923-1924-1925-1926-1927-1928-1929-1930-1931-1932-1933-1934-1935-1936-1937-1938-1939-1940-1941-1942-1943-1944-1945-1946-1947-1948-1949-1950-1951-1952-1953-1954-1955-1956-1957-1958-1959-1960-1961-1962-1963-1964-1965-1966-1967-1968-1969-1970-1971-1972-1973-1974-1975-1976-1977-1978-1979-1980-1981-1982-1983-1984-1985-1986-1987-1988-1989-1990-1991-1992-1993-1994-1995-1996-1997-1998-1999-2000-2001-2002-2003-2004-2005-2006-2007-2008-2009-2010-2011-2012-2013-2014-2015-2016-2017-2018-2019-2020-2021-2022-2023-2024-2025-2026-2027-2028-2029-2030-2031-2032-2033-2034-2035-2036-2037-2038-2039-2040-2041-2042-2043-2044-2045-2046-2047-2048-2049-2050-2051-2052-2053-2054-2055-2056-2057-2058-2059-2060-2061-2062-2063-2064-2065-2066-2067-2068-2069-2070-2071-2072-2073-2074-2075-2076-2077-2078-2079-2080-2081-2082-2083-2084-2085-2086-2087-2088-2089-2090-2091-2092-2093-2094-2095-2096-2097-2098-2099-2100-2101-2102-2103-2104-2105-2106-2107-2108-2109-2110-2111-2112-2113-2114-2115-2116-2117-2118-2119-2120-2121-2122-2123-2124-2125-2126-2127-2128-2129-2130-2131-2132-2133-2134-2135-2136-2137-2138-2139-2140-2141-2142-2143-2144-2145-2146-2147-2148-2149-2150-2151-2152-2153-2154-2155-2156-2157-2158-2159-2160-2161-2162-2163-2164-2165-2166-2167-2168-2169-2170-2171-2172-2173-2174-2175-2176-2177-2178-2179-2180-2181-2182-2183-2184-2185-2186-2187-2188-2189-2190-2191-2192-2193-2194-2195-2196-2197-2198-2199-2200-2201-2202-2203-2204-2205-2206-2207-2208-2209-2210-2211-2212-2213-2214-2215-2216-2217-2218-2219-2220-2221-2222-2223-2224-2225-2226-2227-2228-2229-2230-2231-2232-2233-2234-2235-2236-2237-2238-2239-2240-2241-2242-2243-2244-2245-2246-2247-2248-2249-2250-2251-2252-2253-2254-2255-2256-2257-2258-2259-2260-2261-2262-2263-2264-2265-2266-2267-2268-2269-2270-2271-2272-2273-2274-2275-2276-2277-2278-2279-2280-2281-2282-2283-2284-2285-2286-2287-2288-2289-2290-2291-2292-2293-2294-2295-2296-2297-2298-2299-2300-2301-2302-2303-2304-2305-2306-2307-2308-2309-2310-2311-2312-2313-2314-2315-2316-2317-2318-2319-2320-2321-2322-2323-2324-2325-2326-2327-2328-2329-2330-2331-2332-2333-2334-2335-2336-2337-2338-2339-2340-2341-2342-2343-2344-2345-2346-2347-2348-2349-2350-2351-2352-2353-2354-2355-2356-2357-2358-2359-2360-2361-2362-2363-2364-2365-2366-2367-2368-2369-2370-2371-2372-2373-2374-2375-2376-2377-2378-2379-2380-2381-2382-2383-2384-2385-2386-2387-2388-2389-2390-2391-2392-2393-2394-2395-2396-2397-2398-2399-2400-2401-2402-2403-2404-2405-2406-2407-2408-2409-2410-2411-2412-2413-2414-2415-2416-2417-2418-2419-2420-2421-2422-2423-2424-2425-2426-2427-2428-2429-2430-2431-2432-2433-2434-2435-2436-2437-2438-2439-2440-2441-2442-2443-2444-2445-2446-2447-2448-2449-2450-2451-2452-2453-2454-2455-2456-2457-2458-2459-2460-2461-2462-2463-2464-2465-2466-2467-2468-2469-2470-2471-2472-2473-2474-2475-2476-2477-2478-2479-2480-2481-2482-2483-2484-2485-2486-2487-2488-2489-2490-2491-2492-2493-2494-2495-2496-2497-2498-2499-2500-2501-2502-2503-2504-2505-2506-2507-2508-2509-2510-2511-2512-2513-2514-2515-2516-2517-2518-2519-2520-2521-2522-2523-2524-2525-2526-2527-2528-2529-2530-2531-2532-2533-2534-2535-2536-2537-2538-2539-2540-2541-2542-2543-2544-2545-2546-2547-2548-2549-2550-2551-2552-2553-2554-2555-2556-2557-2558-2559-2560-2561-2562-2563-2564-2565-2566-2567-2568-2569-2570-2571-2572-2573-2574-2575-2576-2577-2578-2579-2580-2581-2582-2583-2584-2585-2586-2587-2588-2589-2590-2591-2592-2593-2594-2595-2596-2597-2598-2599-2600-2601-2602-2603-2604-2605-2606-2607-2608-2609-2610-2611-2612-2613-2614-2615-2616-2617-2618-2619-2620-2621-2622-2623-2624-2625-2626-2627-2628-2629-2630-2631-2632-2633-2634-2635-2636-2637-2638-2639-2640-2641-

Hymenoptera = 124 sp. Chalcidoidea, Proctotrypoidea, sp.

Agonaspis (Encyrtus) fuscicollis - Marchal 1898 1 egg → 12-100 larvae

Polygnotus minutus - Marchal 1903

Copidosoma truneatellus - Silvestri 1906-8 1e. → 1000 ± l.

C. gelechiae - Hegner 1914
Patterson 1915
Leiby 1922 } av. 1e → 163 l.

Platygaster heimalis - Leiby and Will 1923 1e → 1 or 2 l.

P. vernalis - " 1924 1e → av. 8 l.

ポリ多量の昆虫が産卵する結果として、ポリembryonyのPlatygaster、そのほか

Copidosoma、そのほか、世に知られていない。

superabundanceの主要な因子 1. natural enemy 寄生者、捕食者。

2. food 3. climate 等。

gregariousness 社会性、社会生活の条件など。 1. maternal care 母の世帯。

例 - 1. 母が産卵後、卵を一時的に保護する。 2. 産卵後、母は子に餌を与える。 3. 母は子に巣を築かせる。

gregarious lifeの例として、(1) social life + 2. 社会生活 (2) Termite (3) Chironomus (4) 社会生活。

例として、(1) 社会生活 (2) 社会生活 (3) 社会生活 (4) 社会生活。

pentatomie 社会生活の例として、(1) 社会生活 (2) 社会生活 (3) 社会生活 (4) 社会生活。

2. behavior 社会生活の条件など。 1. thigmotaxis 社会生活の条件など。

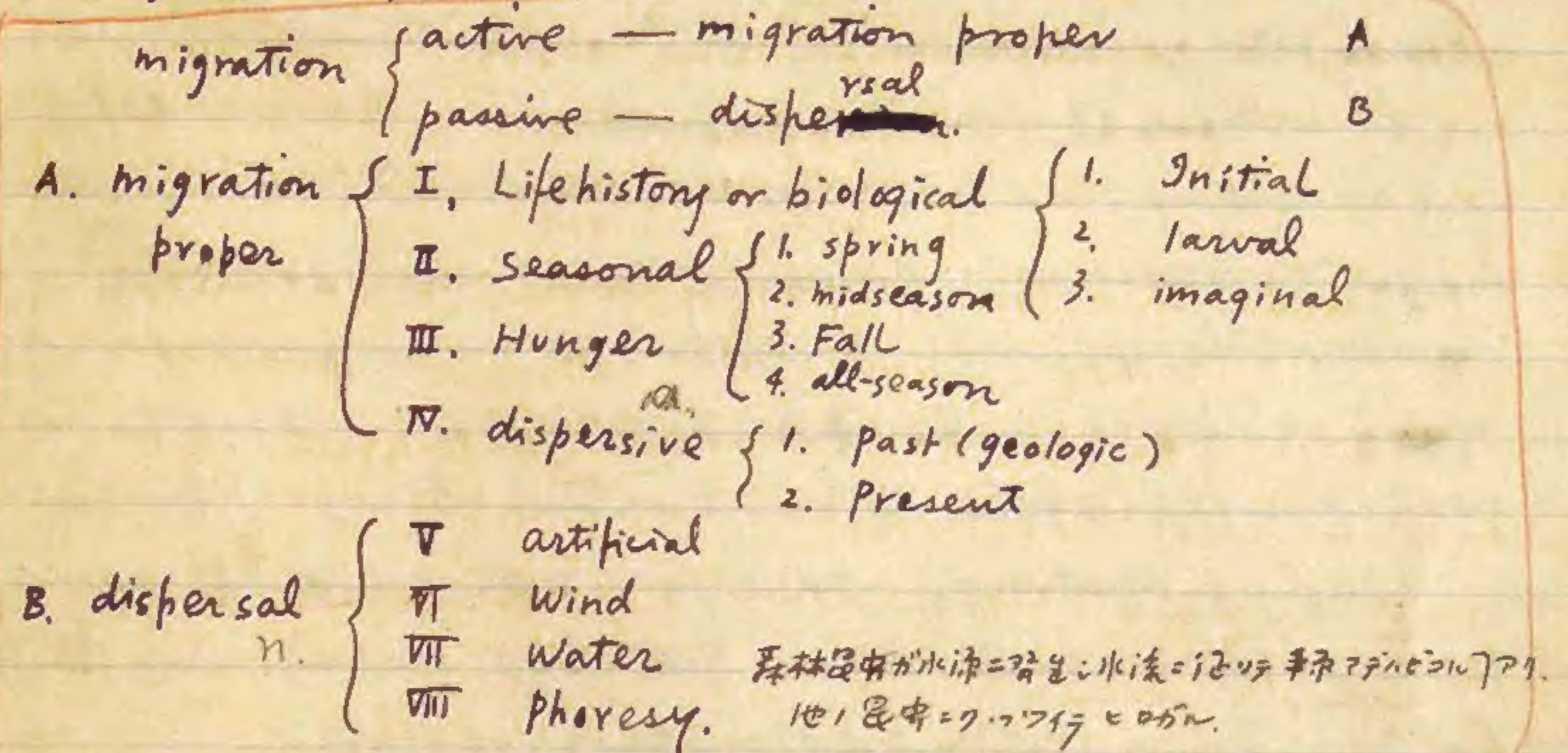
3. migration 社会生活の条件など。 1. hunger migration 社会生活の条件など。

gregariousness, ecological significance 社会生活の条件など。 1. concentrated pacifism (defence) 社会生活の条件など。

Feb. 12.

gregariousness / economic significance. 1. concentrated damage 2. difficulty of control. (hunger migration + sporadic).

migration 8 stage = 7. significance 2.



I. Life history. Life economy, 社会生活の条件など。 1. Initial. 社会生活の条件など。 2. larval. 社会生活の条件など。

2. larval. 社会生活の条件など。 1. feeding. 社会生活の条件など。 2. crisis. 社会生活の条件など。

又、 ϕ 中ありか、ハ 公た有ハイ³⁷ ~~イ~~ = ϕ 中か $\text{puha} = \text{tut}$ il ro = ur 中 ——

2. 'haha migration' = 移 + 羽. 3. adult migration = 交尾 + 羽
1. 17 48 = 'nuptial flight' + 羽. 築 + 羽 = 交尾 + 羽. 又 築 = 羽 + 羽. 又
colony + 羽 = 'swarm'. 又 羽 + 羽 = 'Foraging flight'
2. 2 = 工 + 羽 + 羽. 羽 + 羽 = 羽. 'peregrination'. 羽 + 羽. feeding
place + 羽. feeding place + 羽. 又. feeding place + 羽. 羽 + 羽 = migration.

mosquito / 134775¹¹1. Panama Canal zone - Zetek = 22.

Anopheles sp. (7517) & *Aedes* sp. 7" 35 $\frac{1}{4}$ 12 15 10 11 12 13

所 3 文が 大軍ヲナレ 第 7. 薄暮 = 第 1 行 (35 分 - 45 分) 大軍ハナリ

レイロ月 = 帰って行く (30分位). 交尾は夕方コノ 帰途 = 行く、ムシモト 系へ行く

→ daily migration? アメリカ - 著者, 多 new jersey へ

習性地方 平地 2m 年ハ 常ニテ17% 果樹ノ害ガ多シ Mediterranean fluit

Ry. (*Ceratitis capitata*) の分布は、この島嶼系に、102年1迄分布。

II. seasonal.

1) spring. hibernation is 冬眠, 冬眠山, 林, 果樹園へ帰る.

そんな感じで、カリフォルニア、シエラネバダ山中、遊覧のモカ 7502 = migrate 7

平角ハト出下ル 冬、丘●=集テ休ム。migrate: 冬、丘●=集テ休ム。

出テクル時、望遠鏡ヲ見ルカキテ、霧、如ク、不ク

2. ~~mid season~~ ^{winter} ~~spring~~ host to ^{spring} summer host = 4.7.16.21. 10/21?

りんごのあたまに *Eriosoma lanigera* (Apple Aphis) "
spring

Elm $\xrightarrow{\text{fall}}$ Apple

2) mid season. 矢張り食物が足りなくなる。特に chinch bug の害が
あり、とうとうこれはきつる。又 house fly の 1. 10 分。

Bishop and Laake 1921.

species	maximum distance	rate of diffusion		
		24 hrs.	48 hrs.	
<i>Musca domestica</i>	13.14 miles	6	—	(23万から1 材47便ツ)
<i>Chrysomya macellaria</i> (sheep maggot)	15.1	<u>8</u>	10	
<i>Phormia regina</i>	10.9	—	10.9	

實驗 11 号系ハ 1. 弱イ同ハ migration = 10 系方 + 1. ∴ fly 同ハ 1 + 2 = 2. 逆ニ

又ハ機嫌切ワテトビノ 2. 人爲的+agency, migration = 大切+12ノヲモヤト

3. 2031 fly is migratory habit, 本来有入. 4. 鳥子共 = 飛子 = 29

5. migration / 1/2 + 11 菜園ハ food + 1/2 + 11 養育 1/2 + 11 求メ + 1/2 + 11

3) fall. feeding portion + winter portion = $\frac{1}{3} \times 9 = 3 \text{ g}$. 又..

summer host & winter host = 57724元1. (前世)

all-season. 大P季 = 73リ. 1時 = 10P季 = 4リ. 由果ハ103リ, 10リ = 10リ

1311. Anosia plexippus. (milkweed monarch butterfly). central america

5. 越冬卵. 春 = 1.77 第 2 代 = milkweed = 亮卵. = 21 generation. 夏 = 1.77 = 1.77

3. 例. 冬眠 Hibernation, 27 \bar{F} 27 \bar{F} = 1 \bar{F} . occasional = 大群 \bar{F} + \bar{F}

migrate スルモアリ. 例. = 1347 号. *Vanessa cardui*. 又 とんぼ + 1" =

大群が何処にも知れず トンデユク

III. hunger. 何時にも欠くこと出現する 常々が非常 = 常 = 常。 常々 = 常々 = 常々

が occurrence $\frac{3}{4}$ 生ハ more or less periodic の 直接, 英国ハ 100%

hunger 饥 饥饿 饿死 1. 饿死 2. 饿死 factor 因子 1. 因子 2. 因子 3. 因子 4. 因子 5. 因子

1) 地衣 + 植物 + 真菌 = normal habitat? 非 = 23.3 + 11

(19) ecological continuation to 2017.

(ii) normal food, 粮食. (iii) 'swarm' & 'army' 军队. iv. 新设备

rodin \rightarrow invading \rightarrow ('outbreak')

29 Feb. 16.

V ← 大分県で「^{ヒマ}シロ」 = vitality を失った又天敵、害虫 = 理由。
再々 original habitat = migrate back する (migratory locust など)

(vi) 今の家と、旧家との生態学的平衡 = 一定。 $\frac{1}{2} \times 1 = \frac{1}{2}$
 = 毎年 3 年 1 回 7 回、2000 年 2 回 = period 7 回 7 回 1 回 7 回。 104.1.27.10

'army worm' とうむし (noctuid larval) 満州で汽車が空回りしたと云ふ
migratory locusts.

1. *Schistocerca peregrina*. — old testament = 75, 191. 1224t. 75tj. = 277.
2. *Pachytylus sulcicollis*. — 南西.
3. *Melanoplus spretus*. — U.S.A. Rocky mountain locust. 21.2 = 11.
i permanent ground. | — 2000 位. 10-11 年, invading territory
ii subpermanent g. | = 10-11 年, period of outbreak.
iii invading territory. | 300 miles

4. *Acridium succinctum*.—India

5. *Melanoplus differentialis*. — Kansas etc. U.S.A.
M. *bivittatus*

outbreak, 流行 i. 流行病 = sp. 1. 2 steadily = 持续 (1911). ii. 流行 = 非常 = 非常 (1912). iii. 冬 "dry" "warm" 流行病, 流行 = 非常 (1912-1913) iv. 流行病 = 流行 90%, larva 流行 (1913) v. 6月既 = 非常 (1913) Kansas 全州 = 流行 campaign 流行 874 ton, 流行 11963 sq. miles = 流行 流行 流行 (60-80% 流行)

6. *Pachytylus danicus*. だいめうぼつた. 明治12—13年 = 北海道 = 大鷲全

7. *P. migratorioides*, たいわんばうた. 明治29, 38, 大正. 3, 13-14年
= 大発生. フル フリツピンから 葉末スミデアウケト 及びハル.

N dispersive migration.

岩出地の分布は今日, distribution である. i.e. past \rightarrow 17. geologic.

地球の分布 Paraeartic, Oriental, Australian, Ethiopian,
Neotropical, Nearctic の distribution による。地球の各区域 = 地球の各区域
、各区域の分布 = 2 cosmopolitan + 地球の各区域。

日本，是宰相。

Paralarctic 系统. 本州. 四国. 九州. 北海道. 桦太. 通=朝鲜

oriental 系後. 名: 球. 小. 金. 系. 群. 島

九. 四國, 紀伊半島, 南半島, 東洋 = アラビヤ Oriental + 血, ize 47 21.

分布 / 境界地. ex. 津輕白岩 = Blackiston ~~山~~ 山 = 岩 × 白 = 白岩

辛口 宗谷海峡 七ポロライ 又、朝鮮海峡。

又 *oriental* + *palearctic* - 界分: 九州丰后, 种子岛, 屋久岛 10 = 三宅等

全 (種子島、屋久島、大島、11回 = 青木仙太郎さん) 120 電音分布上 = 7行前

1883 Krakatau, 大噴火アリ 船ヲ、Life lost 甚多。 21 = 死者 43 名、

移り来ルヲ研究セルニ「植物ヲ」ハ

五十六

	Plant spp.		1908	1921
1886	33	Apterygota	1	2
1897	62	Odonata	1	4
1906	139	Isoptera	2	2
		Orthoptera	14	27
		Thysanoptera	0	10
		Rhynchoa	15	74
		hemiptera	1	3
		Coleoptera	23	115
		Hymenoptera	51	66
		Lepidoptera	10	84
		Diptera	32	54
		total insects	<u>150</u>	<u>441</u>
		total animals	196	573

1. climatic factor. 害虫発生は... proportionary = 比例関係
 2. biological factor. 保護鳥 + ... 年々大抵一定数の昆虫が... 害虫が多い... 発生... 2% percentage. 420 枚
 3. disease. climatic factor. 43% ... 害虫発生 = 43% ...
 4. food relation. 植物 + ... 害虫の発生... 意味 + ...
12. 5% parasite 712 ... 10-10-10 + nature of balance, 10-100-10000 + ... outbreak. 9990 7 parasite ... balance = ...

stage	no. individual	Loss %	no. left	Potential increase
eggs	500	0	500	250 x 18%
larval instar I	500	50	250	125 x
II	250	50	125	62 x
III	125	50	62	31 x
IV	62	50	31	15.5 x
V	31	50	15.5	7.75 x
VI	15.5	50	7.75	3.875 x
VII	7.75	50	3.875	2.906 x
pupa	3.875	25	2.906	2.179 x
adult	2.906	25	2.179	1.634 x

1 ♀ ave. no. eggs = 500 Gipsy moth. x 11 倍を示す

control ... Eschrich / Honne (Host) + Tachina (par.) = ...

3 年 ... (Vermerungsziffer 100%)

$$I \text{ yr } \begin{matrix} \text{Host} \\ 300 \end{matrix} \leftarrow \begin{matrix} \text{Tach.} \\ 100 \end{matrix} = \begin{matrix} \text{Schm} \\ 200 \end{matrix} (100 \text{ } \delta + \text{ } \text{ }) + \begin{matrix} \text{Tach.} \\ 100 \end{matrix} (50 \text{ } \delta + \text{ } \text{ })$$

$$II \text{ yr. } (100 \times 100 = 10000) \leftarrow (50 \times 100 = 5000) = 5000 (2500 \text{ } \delta + \text{ } \text{ }) + 5000 (2500 \text{ } \delta + \text{ } \text{ })$$

$$III \text{ yr } (2500 \times 100 = 250000) \leftarrow (2500 \times 100 = 250000) = 0 + 250000 \text{ is } 100\% \text{ control.}$$

※ 1 Gipsy moth / ... 1 ♀ → 6 ♀ ...

— The END —

sequence of parasite
寄生の順序
Parasite ...

x Injurious insects or noxious —, harmful —, pests.
schädliche Insekten.

害虫 - 一般的考察

1. 害虫の意義. ... 害虫は ... 害虫は ... (害虫は ...)

害虫は ... 害虫は ... 害虫は ... (害虫は ...)

2.1 直接 = 人間 / 生活 = ... feeding habit, nesting habit ...

2. 人間 / 害虫 ... 害虫は ...

13. " ... 害虫は ...

4. ... omnivore ... 害虫は ...

5. 非 ... 害虫は ...

16. ... 害虫は ...

3. 害虫 ... Strepsiptera, Zoraptera, Embiidina, Ephemerida,

Neuroptera, Mecoptera

害虫 ... (one species ...). Orthoptera, Isoptera

Mallophaga, Hemiptera, Homoptera, Thysanoptera

Coleoptera, Hymenoptera, Lepidoptera, Siphonoptera,

Diptera.

normal reaction = 正常反応 1. 正常な反応 2. 正常な反応の時

2. 正常な反応の時 3. 正常な反応の時 4. 正常な反応の時

3. 正常な反応の時 4. 正常な反応の時 5. 正常な反応の時

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第三節 生物の Organism as a system of biologic equilibrium
生物の平衡の原理と生物の平衡

organism as a whole 生物の全体 生物の全体 生物の全体
生物の全体 生物の全体 生物の全体 生物の全体 生物の全体

生物の全体 生物の全体 生物の全体 生物の全体 生物の全体

characteristic of protoplasm. 1. liquid system, 液体系 2. 液体系
3. 液体系 4. 液体系 5. 液体系 6. 液体系 7. 液体系 8. 液体系 9. 液体系 10. 液体系

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生物の全体 生物の全体 生物の全体 生物の全体 生物の全体 生物の全体 生物の全体 生物の全体 生物の全体 生物の全体

2. energische 1. 正常な反応 3. energy, transformation 1. 正常な反応

4. cell 1. 正常な反応 5. functional elasticity 1. 正常な反応

7. stimulation 1. 正常な反応 8. 正常な反応 9. 正常な反応 10. 正常な反応

11. 正常な反応 12. 正常な反応 13. 正常な反応 14. 正常な反応 15. 正常な反応 16. 正常な反応 17. 正常な反応 18. 正常な反応 19. 正常な反応 20. 正常な反応

21. 正常な反応 22. 正常な反応 23. 正常な反応 24. 正常な反応 25. 正常な反応 26. 正常な反応 27. 正常な反応 28. 正常な反応 29. 正常な反応 30. 正常な反応

31. 正常な反応 32. 正常な反応 33. 正常な反応 34. 正常な反応 35. 正常な反応 36. 正常な反応 37. 正常な反応 38. 正常な反応 39. 正常な反応 40. 正常な反応

41. 正常な反応 42. 正常な反応 43. 正常な反応 44. 正常な反応 45. 正常な反応 46. 正常な反応 47. 正常な反応 48. 正常な反応 49. 正常な反応 50. 正常な反応

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生物の全体 生物の全体 生物の全体 生物の全体 生物の全体

生物の全体 生物の全体 生物の全体 生物の全体 生物の全体

1. Biogen molecule, 1. 正常な反応 2. 正常な反応 3. 正常な反応 4. 正常な反応 5. 正常な反応 6. 正常な反応 7. 正常な反応 8. 正常な反応 9. 正常な反応 10. 正常な反応

11. 正常な反応 12. 正常な反応 13. 正常な反応 14. 正常な反応 15. 正常な反応 16. 正常な反応 17. 正常な反応 18. 正常な反応 19. 正常な反応 20. 正常な反応

21. 正常な反応 22. 正常な反応 23. 正常な反応 24. 正常な反応 25. 正常な反応 26. 正常な反応 27. 正常な反応 28. 正常な反応 29. 正常な反応 30. 正常な反応

31. 正常な反応 32. 正常な反応 33. 正常な反応 34. 正常な反応 35. 正常な反応 36. 正常な反応 37. 正常な反応 38. 正常な反応 39. 正常な反応 40. 正常な反応

41. 正常な反応 42. 正常な反応 43. 正常な反応 44. 正常な反応 45. 正常な反応 46. 正常な反応 47. 正常な反応 48. 正常な反応 49. 正常な反応 50. 正常な反応

51. 正常な反応 52. 正常な反応 53. 正常な反応 54. 正常な反応 55. 正常な反応 56. 正常な反応 57. 正常な反応 58. 正常な反応 59. 正常な反応 60. 正常な反応

61. 正常な反応 62. 正常な反応 63. 正常な反応 64. 正常な反応 65. 正常な反応 66. 正常な反応 67. 正常な反応 68. 正常な反応 69. 正常な反応 70. 正常な反応

71. 正常な反応 72. 正常な反応 73. 正常な反応 74. 正常な反応 75. 正常な反応 76. 正常な反応 77. 正常な反応 78. 正常な反応 79. 正常な反応 80. 正常な反応

81. 正常な反応 82. 正常な反応 83. 正常な反応 84. 正常な反応 85. 正常な反応 86. 正常な反応 87. 正常な反応 88. 正常な反応 89. 正常な反応 90. 正常な反応

91. 正常な反応 92. 正常な反応 93. 正常な反応 94. 正常な反応 95. 正常な反応 96. 正常な反応 97. 正常な反応 98. 正常な反応 99. 正常な反応 100. 正常な反応

individuality 1. 0. 1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78. 79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94. 95. 96. 97. 98. 99. 100. 101. 102. 103. 104. 105. 106. 107. 108. 109. 110. 111. 112. 113. 114. 115. 116. 117. 118. 119. 120. 121. 122. 123. 124. 125. 126. 127. 128. 129. 130. 131. 132. 133. 134. 135. 136. 137. 138. 139. 140. 141. 142. 143. 144. 145. 146. 147. 148. 149. 150. 151. 152. 153. 154. 155. 156. 157. 158. 159. 160. 161. 162. 163. 164. 165. 166. 167. 168. 169. 170. 171. 172. 173. 174. 175. 176. 177. 178. 179. 180. 181. 182. 183. 184. 185. 186. 187. 188. 189. 190. 191. 192. 193. 194. 195. 196. 197. 198. 199. 200. 201. 202. 203. 204. 205. 206. 207. 208. 209. 210. 211. 212. 213. 214. 215. 216. 217. 218. 219. 220. 221. 222. 223. 224. 225. 226. 227. 228. 229. 230. 231. 232. 233. 234. 235. 236. 237. 238. 239. 240. 241. 242. 243. 244. 245. 246. 247. 248. 249. 250. 251. 252. 253. 254. 255. 256. 257. 258. 259. 260. 261. 262. 263. 264. 265. 266. 267. 268. 269. 270. 271. 272. 273. 274. 275. 276. 277. 278. 279. 280. 281. 282. 283. 284. 285. 286. 287. 288. 289. 290. 291. 292. 293. 294. 295. 296. 297. 298. 299. 300. 301. 302. 303. 304. 305. 306. 307. 308. 309. 310. 311. 312. 313. 314. 315. 316. 317. 318. 319. 320. 321. 322. 323. 324. 325. 326. 327. 328. 329. 330. 331. 332. 333. 334. 335. 336. 337. 338. 339. 340. 341. 342. 343. 344. 345. 346. 347. 348. 349. 350. 351. 352. 353. 354. 355. 356. 357. 358. 359. 360. 361. 362. 363. 364. 365. 366. 367. 368. 369. 370. 371. 372. 373. 374. 375. 376. 377. 378. 379. 380. 381. 382. 383. 384. 385. 386. 387. 388. 389. 390. 391. 392. 393. 394. 395. 396. 397. 398. 399. 400. 401. 402. 403. 404. 405. 406. 407. 408. 409. 410. 411. 412. 413. 414. 415. 416. 417. 418. 419. 420. 421. 422. 423. 424. 425. 426. 427. 428. 429. 430. 431. 432. 433. 434. 435. 436. 437. 438. 439. 440. 441. 442. 443. 444. 445. 446. 447. 448. 449. 450. 451. 452. 453. 454. 455. 456. 457. 458. 459. 460. 461. 462. 463. 464. 465. 466. 467. 468. 469. 470. 471. 472. 473. 474. 475. 476. 477. 478. 479. 480. 481. 482. 483. 484. 485. 486. 487. 488. 489. 490. 491. 492. 493. 494. 495. 496. 497. 498. 499. 500. 501. 502. 503. 504. 505. 506. 507. 508. 509. 510. 511. 512. 513. 514. 515. 516. 517. 518. 519. 520. 521. 522. 523. 524. 525. 526. 527. 528. 529. 530. 531. 532. 533. 534. 535. 536. 537. 538. 539. 540. 541. 542. 543. 544. 545. 546. 547. 548. 549. 550. 551. 552. 553. 554. 555. 556. 557. 558. 559. 560. 561. 562. 563. 564. 565. 566. 567. 568. 569. 570. 571. 572. 573. 574. 575. 576. 577. 578. 579. 580. 581. 582. 583. 584. 585. 586. 587. 588. 589. 590. 591. 592. 593. 594. 595. 596. 597. 598. 599. 600. 601. 602. 603. 604. 605. 606. 607. 608. 609. 610. 611. 612. 613. 614. 615. 616. 617. 618. 619. 620. 621. 622. 623. 624. 625. 626. 627. 628. 629. 630. 631. 632. 633. 634. 635. 636. 637. 638. 639. 640. 641. 642. 643. 644. 645. 646. 647. 648. 649. 650. 651. 652. 653. 654. 655. 656. 657. 658. 659. 660. 661. 662. 663. 664. 665. 666. 667. 668. 669. 670. 671. 672. 673. 674. 675. 676. 677. 678. 679. 680. 681. 682. 683. 684. 685. 686. 687. 688. 689. 690. 691. 692. 693. 694. 695. 696. 697. 698. 699. 700. 701. 702. 703. 704. 705. 706. 707. 708. 709. 710. 711. 712. 713. 714. 715. 716. 717. 718. 719. 720. 721. 722. 723. 724. 725. 726. 727. 728. 729. 730. 731. 732. 733. 734. 735. 736. 737. 738. 739. 740. 741. 742. 743. 744. 745. 746. 747. 748. 749. 750. 751. 752. 753. 754. 755. 756. 757. 758. 759. 760. 761. 762. 763. 764. 765. 766. 767. 768. 769. 770. 771. 772. 773. 774. 775. 776. 777. 778. 779. 780. 781. 782. 783. 784. 785. 786. 787. 788. 789. 790. 791. 792. 793. 794. 795. 796. 797. 798. 799. 800. 801. 802. 803. 804. 805. 806. 807. 808. 809. 810. 811. 812. 813. 814. 815. 816. 817. 818. 819. 820. 821. 822. 823. 824. 825. 826. 827. 828. 829. 830. 831. 832. 833. 834. 835. 836. 837. 838. 839

1. Individuality of first order — Cell (=Elementary organism)
2. " second " tissue
3. third " — organ
4. fourth " — person (= individual)
5. fifth " state (=society)

organ 集体 person = 个人. 独特, individuality 个性

• person is organisms in 3rd + organ, coordinate system etc.

-> 大々 machine, factory + 多量に 其中の生命現象は orderly + regulatory system にてコントロールされる。 >> 17.10 の 習題。

485. 老衰 senescence, 生 3k + 13k, 1/43 = 751111. $\Rightarrow \frac{1}{4}$ 一般 4211111.
 5074. 又 ecology, 1/43 = 2111.

life-history, life-habits = behavior (activity, reflex, instinct etc)

organism / 17.9 / 特点 / 协调统一

co-ordination } unity
correlation }

- 11, harmony 7 78.761 7' 22

Summary.

1. biological equilibrium is organism's physicochemical + dynamic process, complex & perpetual = continuous = 1 to 4.

is the energy $\hbar\omega$ transform

2. 18岁起=1. 起=2' continuous in action. 连续, 持续=0.07 岁
同时 = 连续 = 连续 = 连续

3. h_f changes .. orderly, regularly .. $\propto n$

4. 167, changes, 39, 211, 144, behavior 1678 = 75, 100

5. behavior \rightarrow モトメテ 分析 \rightarrow 觀察 2nd. 生物... \rightarrow , dynamic equilibrium \rightarrow 保つてモトネン。 (ie \rightarrow , equilibrium \rightarrow 平衡状態の事) R2.) (ie \rightarrow , optimum = 最適点のこと)

2.3.2.1 Organism: a system of biological equilibrium, etc.

一所的貢獻

W. B. Bayliss: ¹⁹¹⁸ Principles of general physiology chap I-IV.

Verborn 1922 allgemeine Physiologie.

ENT. 22 Sep.

Section V Environment as a Dynamic Complex.

1. Introduction

- i 生物/环境上的互动 / factor, complex 的 + ... 因素之间的, on the complex 的 environment
- ii 一个 complex 的 system factor 的 analyzed factor 的 分析 (的) = 分析一个 complex 的 system factor 的 analyzed factor 的 分析 (的)
- iii 环境上的 factor / ... 因素 + reaction, chain 的 complex 的 + ... 因素

2. general analysis of factors. (ordinary habitat = 74)

b) Inorganic

a. physical. light, temperature, water (= 水, 湿度), pressure (气压, 水压 = 静水圧), gravity, electricity, medium / current (aneuotaxis, 偏光性, 偏磁性等), density of medium (水中/insect = 浮力, 浮力 = 浮力), materials for a body, molar agents (接触刺激, 化学刺激, 物理刺激 = 温度, 湿度, 光等)

b. chemical. oxygen. (16g + 16g, 32g) oxid carbon CO , CO_2 , hydrogen, N , NH_3 , poisons (20g, 16g = 36g)

a) general ^(非特異的) i Oxidizing agent. ii catalytic. (volatile narcotic)

iii. salt-forming (H_2S , products) iv. substituting (NH_3 , Zn^{2+} , HCN etc)

b) special or selective. (특수, 선택적. 예: 스포츠, 예술, 과학 등)

c. physico-chemical. water (10/2/17/12/13) v. 2.

d. Factor-time (succession)

c Factor-space (over-population, etc.)

2) Organic

a. Animal : as living entities

a) members of the same species. (material, indiv. colony, member
typ. (Trophallaxis.) member of community, i.e. - ecological complex.

Ad 1919, 1954 - carnivals & competition

b) members of different species.

symbiosis (Trophallaxis. 食物传递), parasitism or commensalism.

predatism, parasitism. men. of community (synoecosis) (social parasitism)

ii as dead matters

waste, possible food, material for abode, modifier of the chemical nature of the medium, m. & physical nature. (as 死物)

as a living body = 1 2 3 4 5 6 7 8 9 10

Oct. 2.

b. 动植物

i. as a living. 食物, shelter, abode 1 2 3 4 5 6 7 8 9 10

食物, 1 2 3 4 5 6 7 8 9 10, insectivorous plant, competitor (1 2 3 4 5 6 7 8 9 10)

symbiosis

ii as a dead waste (1 2 3 4 5 6 7 8 9 10) shelter, abode 1 2 3 4 5 6 7 8 9 10

abode, chemical nature 1 2 3 4 5 6 7 8 9 10

3. Complex of factors. 1 2 3 4 5 6 7 8 9 10, factor 1 2 3 4 5 6 7 8 9 10, combination 1 2 3 4 5 6 7 8 9 10, dependent 1 2 3 4 5 6 7 8 9 10, factor 1 2 3 4 5 6 7 8 9 10, continuous 1 2 3 4 5 6 7 8 9 10

factor complex 1 2 3 4 5 6 7 8 9 10, environment 1 2 3 4 5 6 7 8 9 10, complex 1 2 3 4 5 6 7 8 9 10, index 1 2 3 4 5 6 7 8 9 10

De Candolle 1 2 3 4 5 6 7 8 9 10, 6°C 1 2 3 4 5 6 7 8 9 10, 4°C 1 2 3 4 5 6 7 8 9 10, 10°C 1 2 3 4 5 6 7 8 9 10

index 1 2 3 4 5 6 7 8 9 10, Morriam 1 2 3 4 5 6 7 8 9 10, life zone 1 2 3 4 5 6 7 8 9 10, 1 2 3 4 5 6 7 8 9 10

1 2 3 4 5 6 7 8 9 10, 1 2 3 4 5 6 7 8 9 10, 1 2 3 4 5 6 7 8 9 10, 1 2 3 4 5 6 7 8 9 10, 1 2 3 4 5 6 7 8 9 10

Walker 1 2 3 4 5 6 7 8 9 10, humidity 1 2 3 4 5 6 7 8 9 10, Canada 1 2 3 4 5 6 7 8 9 10, life zone 1 2 3 4 5 6 7 8 9 10, Shelford 1 2 3 4 5 6 7 8 9 10

factor 1 2 3 4 5 6 7 8 9 10, 1 2 3 4 5 6 7 8 9 10, 1 2 3 4 5 6 7 8 9 10, 1 2 3 4 5 6 7 8 9 10, 1 2 3 4 5 6 7 8 9 10

is. evaporation 1 2 3 4 5 6 7 8 9 10, 1 2 3 4 5 6 7 8 9 10, 1 2 3 4 5 6 7 8 9 10, 1 2 3 4 5 6 7 8 9 10, 1 2 3 4 5 6 7 8 9 10

condition 1 2 3 4 5 6 7 8 9 10, 1 2 3 4 5 6 7 8 9 10, 1 2 3 4 5 6 7 8 9 10, 1 2 3 4 5 6 7 8 9 10, 1 2 3 4 5 6 7 8 9 10

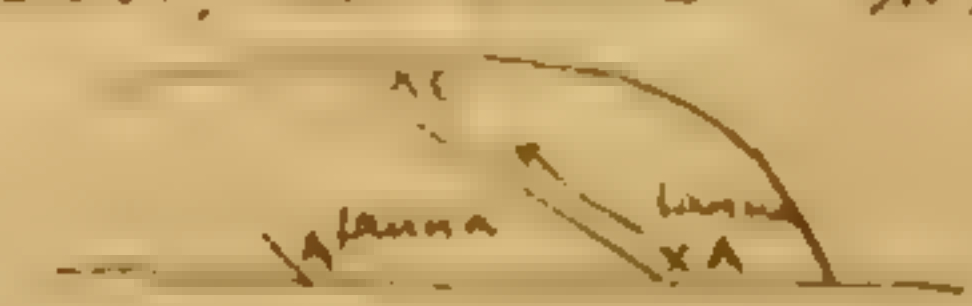
1 2 3 4 5 6 7 8 9 10, 1 2 3 4 5 6 7 8 9 10, 1 2 3 4 5 6 7 8 9 10, 1 2 3 4 5 6 7 8 9 10, 1 2 3 4 5 6 7 8 9 10

4. Orderly sequence of changes in the physical environment.

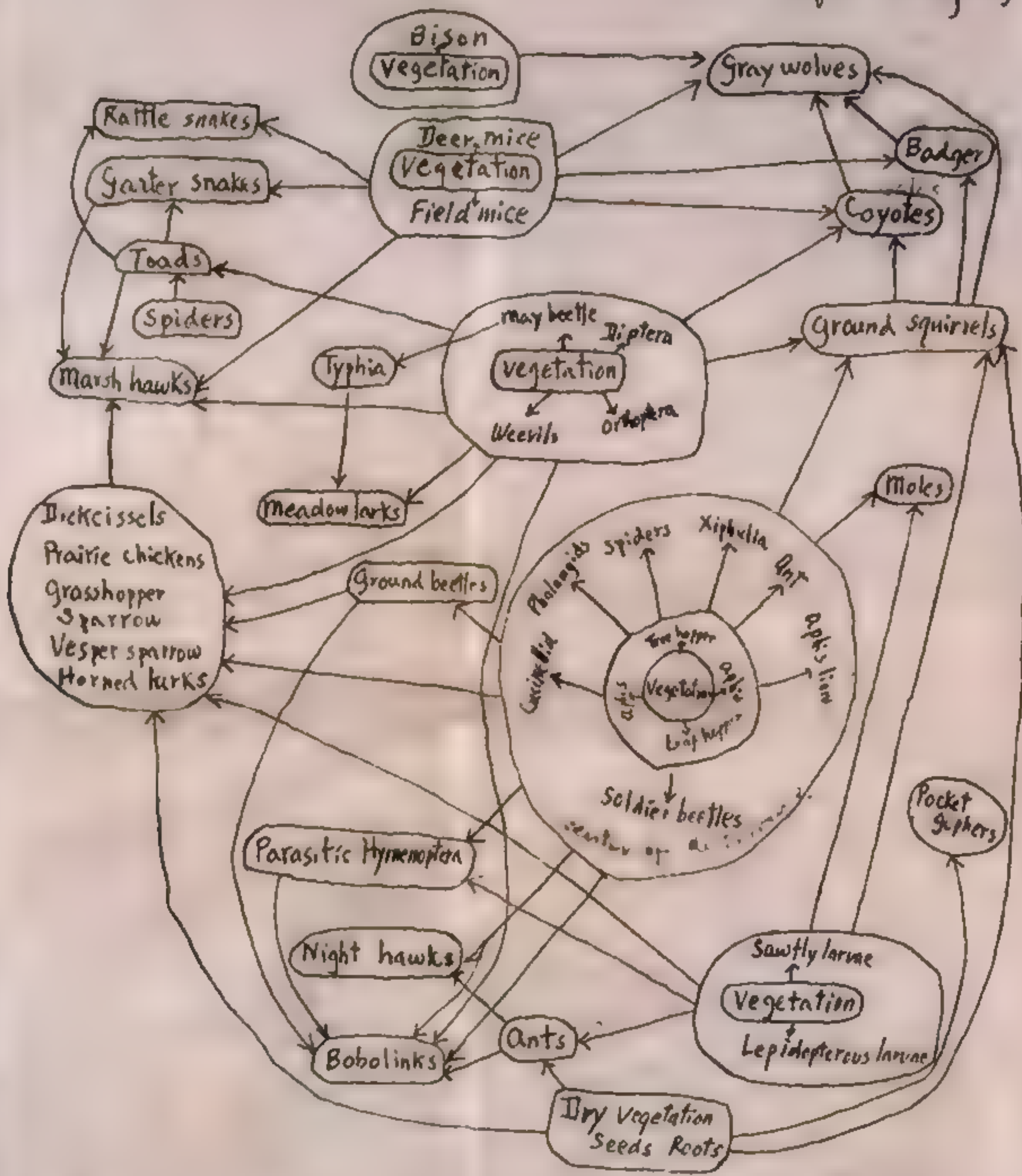
1 Energy agents and processes

a. ^{major} measure changes. geological change. { physiographic, climatic

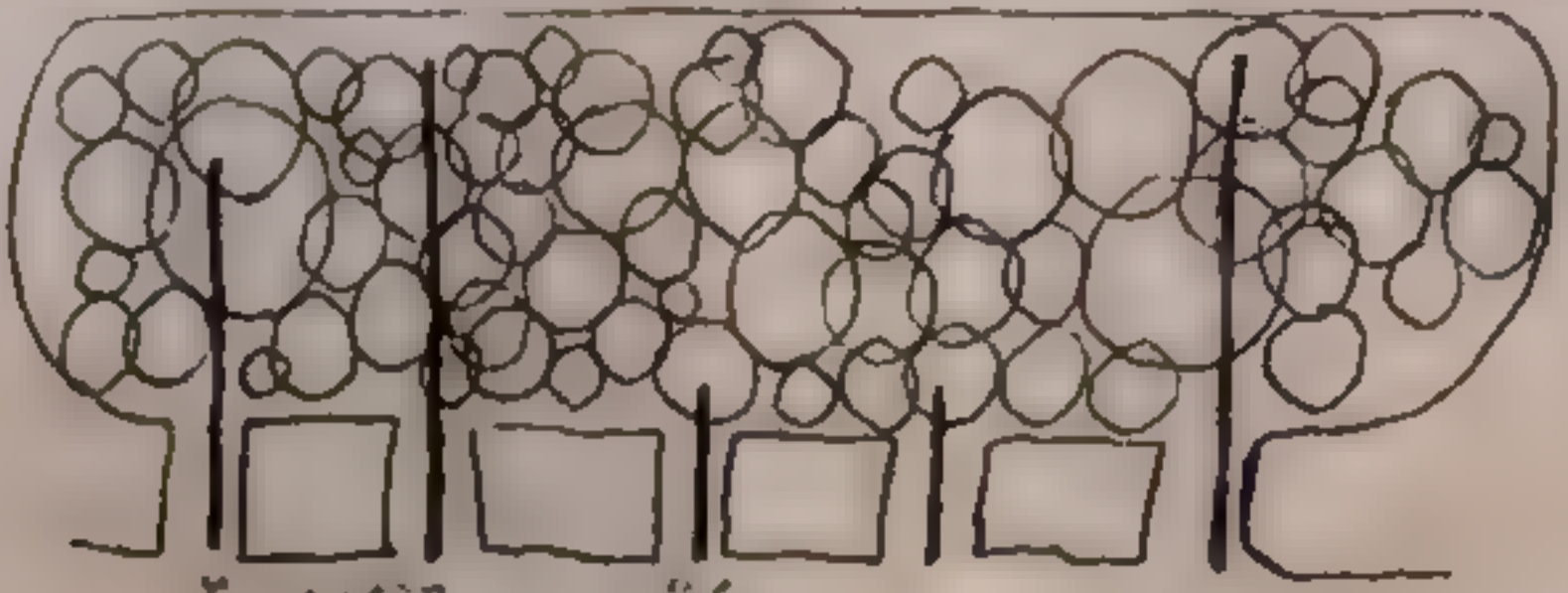
erosion, level down 1 2 3 4 5 6 7 8 9 10, fauna, migration



(after Sheffield)



Circles and ellipses include groups of organisms which are commonly eaten by the same animals, and groups eating similar food. Arrows point from the animals eaten to those doing the eating.



Life history Complex
(Food relation) of
a land community

period 1.1 - 2.9

b. minor changes (daily changes)
daily changes
Diurnal Nocturnal, seasonal, meteorological
annual

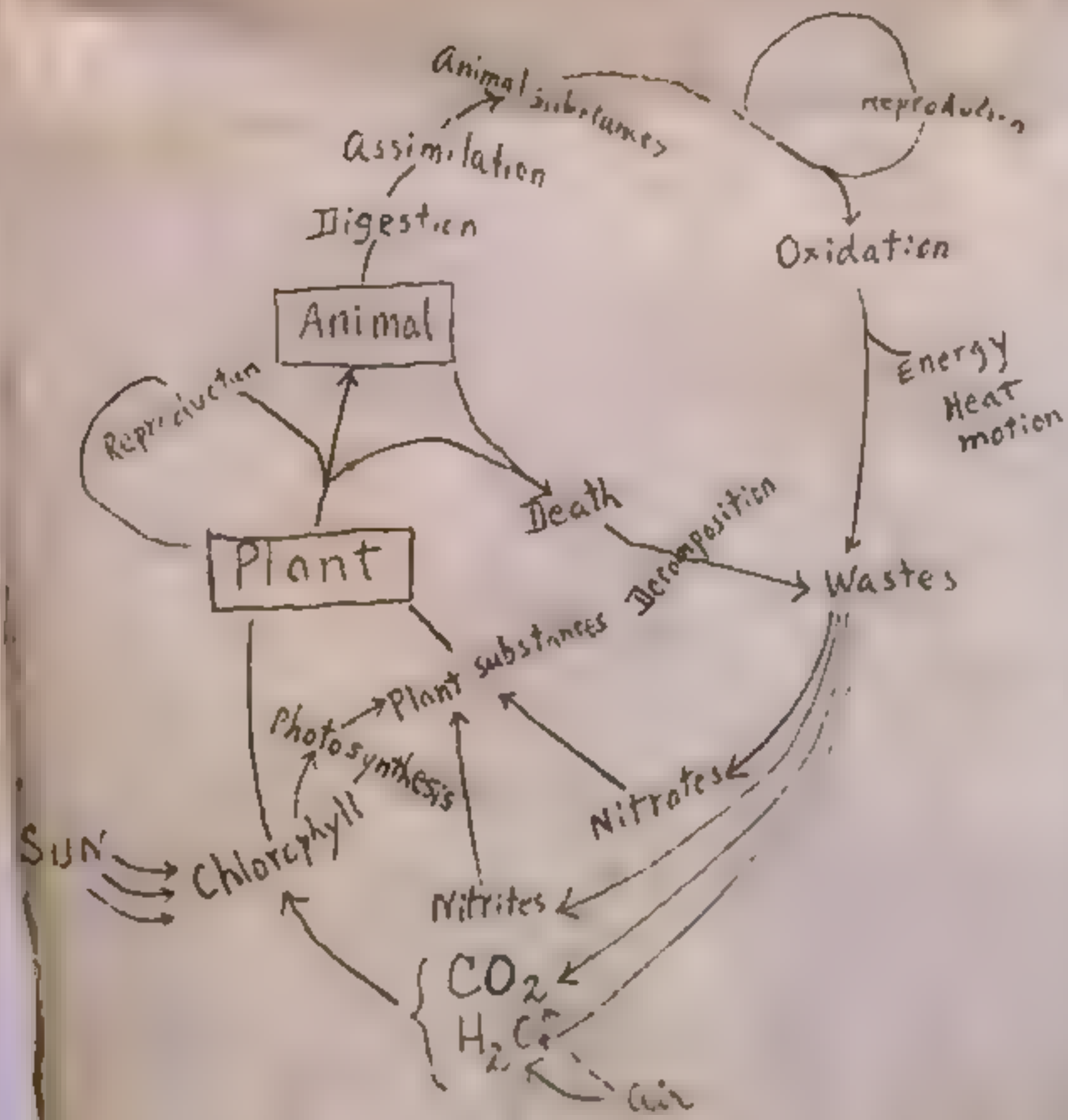
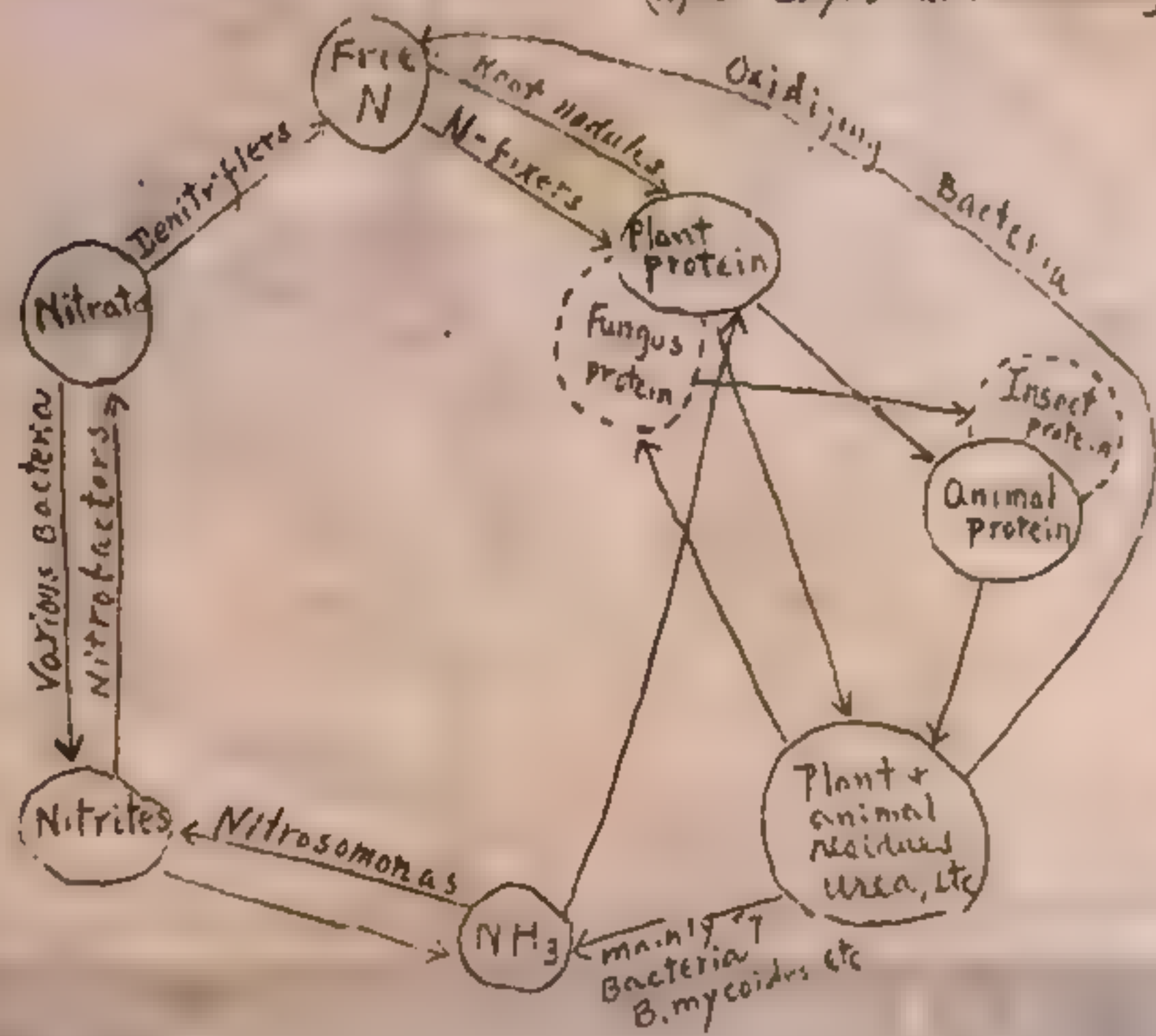
Section V Ecological Complex.

$$X^* = \{x^* \in X : \exists y^* \in Y, (x^*, y^*) \in \Gamma\} \quad (\text{Complex organism + complex environment})$$

1 chemical cycle - carbon, oxygen, nitrogen etc. 在环境中循环利用, 循环, 循环, 循环, circulate 动词

Nitrogen Cycle

(after Bayliss and Baumbarger)



Chemical Cycle

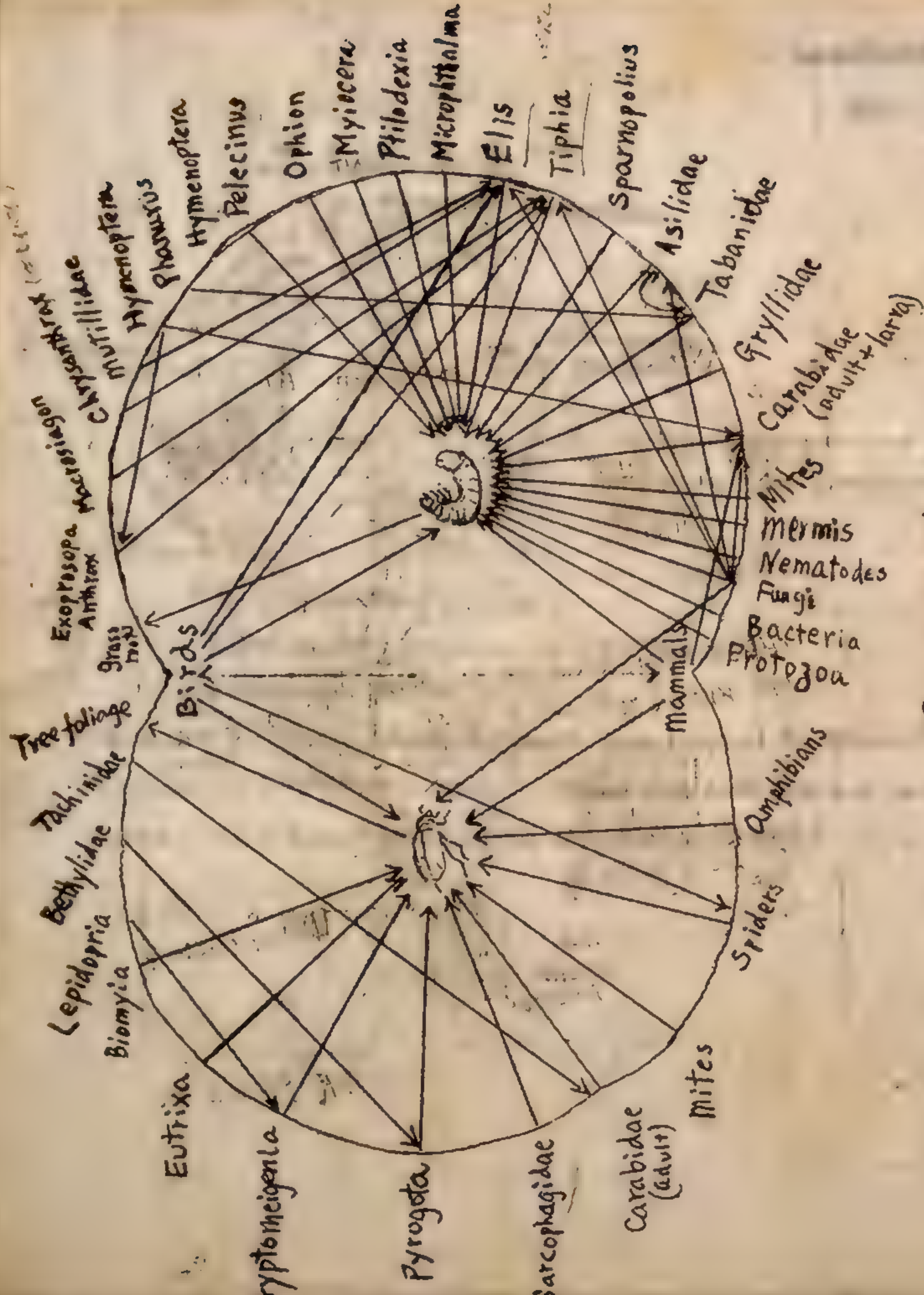
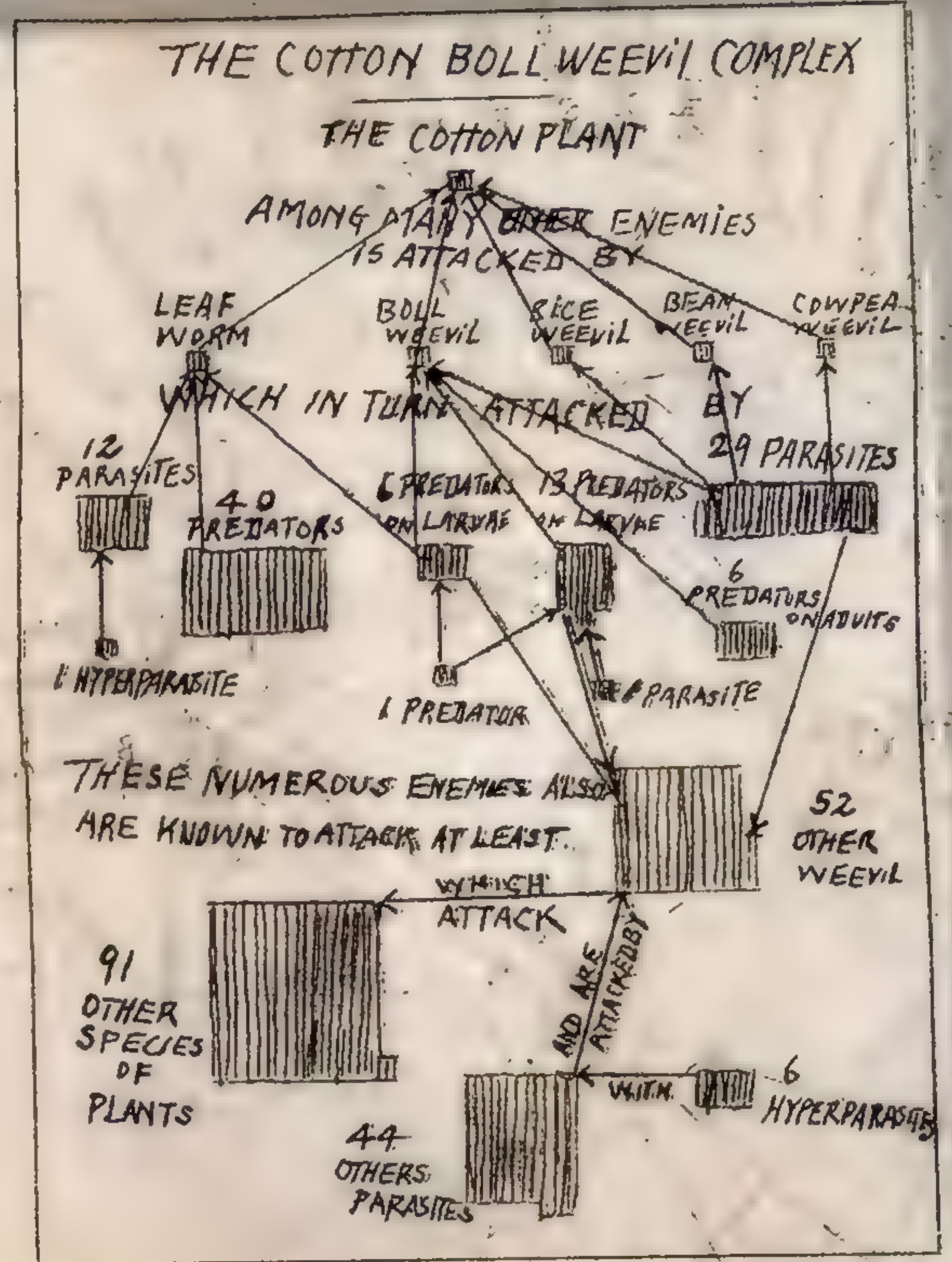
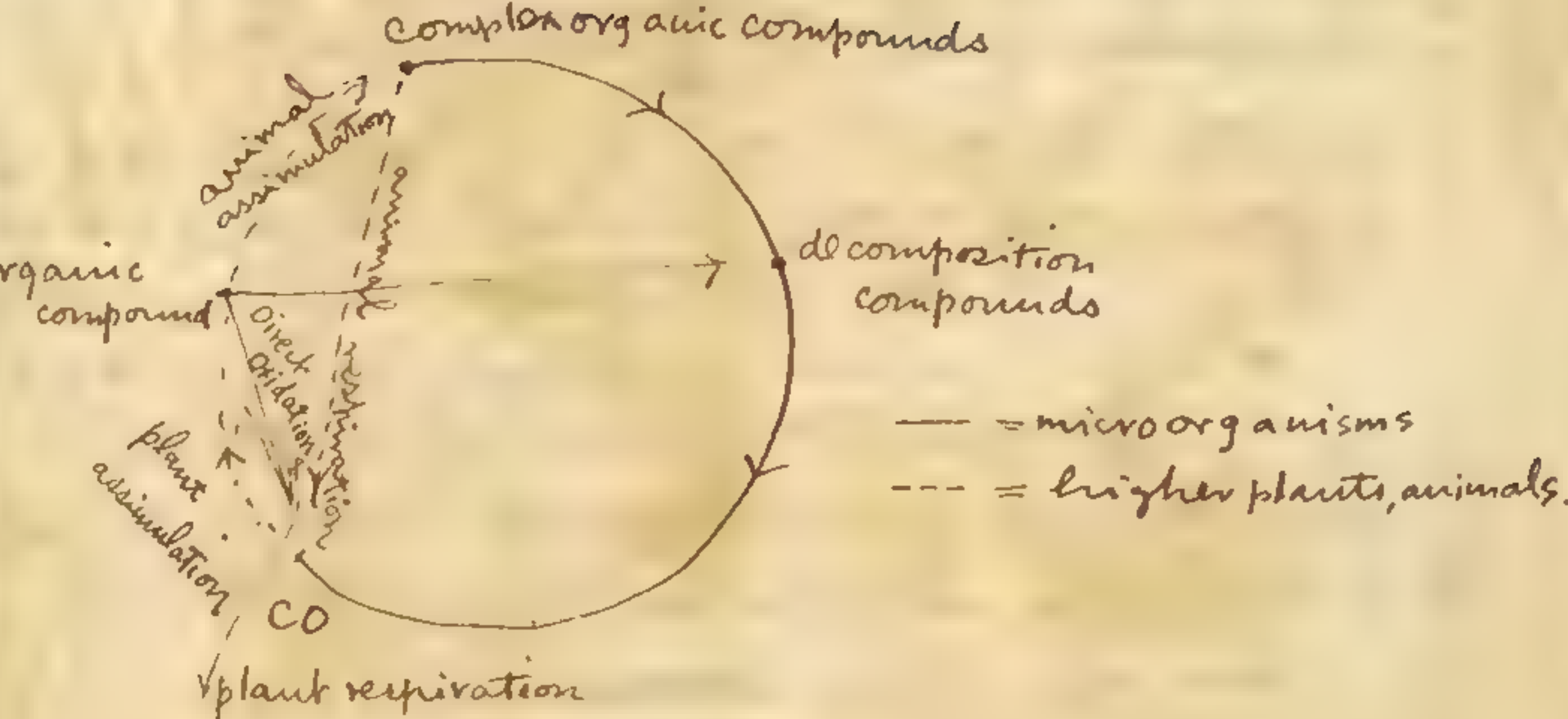


Diagram showing interrelations of Phytophago and its enemies. The arrows point towards the food-plant, host, or prey of parasite or predator. (after Davis)



Blank
Oct 5.

carbon cycle



2. Food cycles
3. Biological cycles.

reference T.J. Davis: - Contributions to Knowledge of the Natural Enemies of Phyllophaga, 1919. Illinois state Nat. Hist. Bull. XII art V.
Pierce: - The Insect enemies of the cotton boll weevil, 1912, U.S. D. A. Bull 100.



showed the various parts of the system. The diagram shows the flow of energy and nutrients through the food chain. The organisms are arranged around the perimeter of a circle, with lines connecting them to a central point. The organisms listed include: Bacteria, Fungi, Mites, Beetles, Aphids, Grasshoppers, Caterpillars, Spiders, Scorpions, Centipedes, Millipedes, Crustaceans, Fish, Birds, Mammals, and Reptiles.

ecological equilibrium = $\frac{1}{2}$ $\left\{ \begin{array}{l} 1. \text{ Physiological Eq.} \\ 2. \text{ Ecological Eq.} \end{array} \right.$

ecological equilibrium = $\frac{1}{2}$ $\left\{ \begin{array}{l} 1. \text{ Physiological Eq.} \\ 2. \text{ Ecological Eq.} \end{array} \right.$

1. Physiological Eq. individual organism, physiological process
= 生理方程式. \Rightarrow 4章3節, 1節節14p \Rightarrow physiological proportionality

[illegible]

4/18/17. 2 control mechanisms / 1.67, regulatory mechanisms / 15.21 = 9.1

1. 1/2, 2, 1/2, con. 1/2, 2, 1/2, neutrality v. m.

ii respiratory v. m. 呼吸中枢神经-脑 O_2 , CO_2 etc, 血液

iii Temperature. • respiratory rate (O_2 rate)

iv Osmotic pressure " 水柱高 = 32.4 cm

✓ endocrine (endocrine) " hormones. Ex: = immunity = 1/2 H + 1/2 J.

ii viscosity - 14/15 DP 11+32

2. ecological eq. \rightarrow 3rd 2 community = 5/7 54.7%

又八环境: 7-11 1100, 44%, 72-11 in constant balance.

ie species, oscillation ± 1 .

平 43113. 542-7710

virgin nature - stz. inorganic factor, 70% nature " 1 法规 =

又例をたれ。 $\gamma_L = \text{計測値} + \epsilon_{L1} + \epsilon_{L2}$ i.e. 生物性 \bullet inherent charater

cap capacity (adaptivity etc) etc. balance

man made nature - 人造. man " nature 7 3 读 11 更 = 21 - 3 10 70 7

2 土中トスル 砂カ 771

ecological eq. " never perfect " " never fixed " " environment

factor is fixed $7+19x$ $40 = 512$. $7+19x$

同野不仁

i.e. 207, relative stability = par. virgin nature - 1157001

stability, or $\frac{1}{2}$ of $\frac{1}{2}$ (years, adjust, adaptation, 1% & 2%)

man cultured nature, in 2 2 5" malayusint 1. 31 in dr

11. 8k, 3k → nature, balance, reconstruct. 3k: 12, 20, 29, 41 →

new formed balance = old nature + $\frac{1}{2}$ of the "new" nature. man, 18 to

ハ・フ・モ・サ・イ

Origin of insect pest. ecological eq. / maladjustment of it.

[illegible]

the factor, 1 cm. = 0.775. Forbes - 12-1, 2-2, 3-3, 4-4, 5-5, 6-6, 7-7, 8-8, 9-9, 10-10, 11-11, 12-12, 13-13, 14-14, 15-15, 16-16, 17-17, 18-18, 19-19, 20-20, 21-21, 22-22, 23-23, 24-24, 25-25, 26-26, 27-27, 28-28, 29-29, 30-30, 31-31, 32-32, 33-33, 34-34, 35-35, 36-36, 37-37, 38-38, 39-39, 40-40, 41-41, 42-42, 43-43, 44-44, 45-45, 46-46, 47-47, 48-48, 49-49, 50-50, 51-51, 52-52, 53-53, 54-54, 55-55, 56-56, 57-57, 58-58, 59-59, 60-60, 61-61, 62-62, 63-63, 64-64, 65-65, 66-66, 67-67, 68-68, 69-69, 70-70, 71-71, 72-72, 73-73, 74-74, 75-75, 76-76, 77-77, 78-78, 79-79, 80-80, 81-81, 82-82, 83-83, 84-84, 85-85, 86-86, 87-87, 88-88, 89-89, 90-90, 91-91, 92-92, 93-93, 94-94, 95-95, 96-96, 97-97, 98-98, 99-99, 100-100, 101-101, 102-102, 103-103, 104-104, 105-105, 106-106, 107-107, 108-108, 109-109, 110-110, 111-111, 112-112, 113-113, 114-114, 115-115, 116-116, 117-117, 118-118, 119-119, 120-120, 121-121, 122-122, 123-123, 124-124, 125-125, 126-126, 127-127, 128-128, 129-129, 130-130, 131-131, 132-132, 133-133, 134-134, 135-135, 136-136, 137-137, 138-138, 139-139, 140-140, 141-141, 142-142, 143-143, 144-144, 145-145, 146-146, 147-147, 148-148, 149-149, 150-150, 151-151, 152-152, 153-153, 154-154, 155-155, 156-156, 157-157, 158-158, 159-159, 160-160, 161-161, 162-162, 163-163, 164-164, 165-165, 166-166, 167-167, 168-168, 169-169, 170-170, 171-171, 172-172, 173-173, 174-174, 175-175, 176-176, 177-177, 178-178, 179-179, 180-180, 181-181, 182-182, 183-183, 184-184, 185-185, 186-186, 187-187, 188-188, 189-189, 190-190, 191-191, 192-192, 193-193, 194-194, 195-195, 196-196, 197-197, 198-198, 199-199, 200-200, 201-201, 202-202, 203-203, 204-204, 205-205, 206-206, 207-207, 208-208, 209-209, 210-210, 211-211, 212-212, 213-213, 214-214, 215-215, 216-216, 217-217, 218-218, 219-219, 220-220, 221-221, 222-222, 223-223, 224-224, 225-225, 226-226, 227-227, 228-228, 229-229, 230-230, 231-231, 232-232, 233-233, 234-234, 235-235, 236-236, 237-237, 238-238, 239-239, 240-240, 241-241, 242-242, 243-243, 244-244, 245-245, 246-246, 247-247, 248-248, 249-249, 250-250, 251-251, 252-252, 253-253, 254-254, 255-255, 256-256, 257-257, 258-258, 259-259, 260-260, 261-261, 262-262, 263-263, 264-264, 265-265, 266-266, 267-267, 268-268, 269-269, 270-270, 271-271, 272-272, 273-273, 274-274, 275-275, 276-276, 277-277, 278-278, 279-279, 280-280, 281-281, 282-282, 283-283, 284-284, 285-285, 286-286, 287-287, 288-288, 289-289, 290-290, 291-291, 292-292, 293-293, 294-294, 295-295, 296-296, 297-297, 298-298, 299-299, 300-300, 301-301, 302-302, 303-303, 304-304, 305-305, 306-306, 307-307, 308-308, 309-309, 310-310, 311-311, 312-312, 313-313, 314-314, 315-315, 316-316, 317-317, 318-318, 319-319, 320-320, 321-321, 322-322, 323-323, 324-324, 325-325, 326-326, 327-327, 328-328, 329-329, 330-330, 331-331, 332-332, 333-333, 334-334, 335-335, 336-336, 337-337, 338-338, 339-339, 340-340, 341-341, 342-342, 343-343, 344-344, 345-345, 346-346, 347-347, 348-348, 349-349, 350-350, 351-351, 352-352, 353-353, 354-354, 355-355, 356-356, 357-357, 358-358, 359-359, 360-360, 361-361, 362-362, 363-363, 364-364, 365-365, 366-366, 367-367, 368-368, 369-369, 370-370, 371-371, 372-372, 373-373, 374-374, 375-375, 376-376, 377-377, 378-378, 379-379, 380-380, 381-381, 382-382, 383-383, 384-384, 385-385, 386-386, 387-387, 388-388, 389-389, 390-390, 391-391, 392-392, 393-393, 394-394, 395-395, 396-396, 397-397, 398-398, 399-399, 400-400, 401-401, 402-402, 403-403, 404-404, 405-405, 406-406, 407-407, 408-408, 409-409, 410-410, 411-411, 412-412, 413-413, 414-414, 415-415, 416-416, 417-417, 418-418, 419-419, 420-420, 421-421, 422-422, 423-423, 424-424, 425-425, 426-426, 427-427, 428-428, 429-429, 430-430, 431-431, 432-432, 433-433, 434-434, 435-435, 436-436, 437-437, 438-438, 439-439, 440-440, 441-441, 442-442, 443-443, 444-444, 445-445, 446-446, 447-447, 448-448, 449-449, 450-450, 451-451, 452-452, 453-453, 454-454, 455-455, 456-456, 457-457, 458-458, 459-459, 460-460, 461-461, 462-462, 463-463, 464-464, 465-465, 466-466, 467-467, 468-468, 469-469, 470-470, 471-471, 472-472, 473-473, 474-474, 475-475, 476-476, 477-477

adjustment = 0.05 1992: only 1 outbreak, 9 VZ + 13 HB

1. oscillating species (What's there? fecundity 176-181 / adaptivity, 32-41, 133, 134, 135, 136, 137)

2. rest restraining factors against them

3. Removing or weakening of the restraining factors by man.

4. efforts to reestablish the adjustment

5. reaching to new-formal balance.

Toxoptera graminum 1841. ($\frac{1}{2}$ = 1st aphid)

$\frac{1}{2}$ species = *Aphidius testaceipes* (Hymenoptera) + 1 misadjustment.

Toxoptera "0" → 95% Pith + 5% in 1/2 of 1/2. C. = aphidius

56F 12L : 16" 5x14" 春 = 40°-50° 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52, 54, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392, 394, 396, 398, 400, 402, 404, 406, 408, 410, 412, 414, 416, 418, 420, 422, 424, 426, 428, 430, 432, 434, 436, 438, 440, 442, 444, 446, 448, 450, 452, 454, 456, 458, 460, 462, 464, 466, 468, 470, 472, 474, 476, 478, 480, 482, 484, 486, 488, 490, 492, 494, 496, 498, 500, 502, 504, 506, 508, 510, 512, 514, 516, 518, 520, 522, 524, 526, 528, 530, 532, 534, 536, 538, 540, 542, 544, 546, 548, 550, 552, 554, 556, 558, 560, 562, 564, 566, 568, 570, 572, 574, 576, 578, 580, 582, 584, 586, 588, 590, 592, 594, 596, 598, 600, 602, 604, 606, 608, 610, 612, 614, 616, 618, 620, 622, 624, 626, 628, 630, 632, 634, 636, 638, 640, 642, 644, 646, 648, 650, 652, 654, 656, 658, 660, 662, 664, 666, 668, 670, 672, 674, 676, 678, 680, 682, 684, 686, 688, 690, 692, 694, 696, 698, 700, 702, 704, 706, 708, 710, 712, 714, 716, 718, 720, 722, 724, 726, 728, 730, 732, 734, 736, 738, 740, 742, 744, 746, 748, 750, 752, 754, 756, 758, 760, 762, 764, 766, 768, 770, 772, 774, 776, 778, 780, 782, 784, 786, 788, 790, 792, 794, 796, 798, 800, 802, 804, 806, 808, 810, 812, 814, 816, 818, 820, 822, 824, 826, 828, 830, 832, 834, 836, 838, 840, 842, 844, 846, 848, 850, 852, 854, 856, 858, 860, 862, 864, 866, 868, 870, 872, 874, 876, 878, 880, 882, 884, 886, 888, 890, 892, 894, 896, 898, 900, 902, 904, 906, 908, 910, 912, 914, 916, 918, 920, 922, 924, 926, 928, 930, 932, 934, 936, 938, 940, 942, 944, 946, 948, 950, 952, 954, 956, 958, 960, 962, 964, 966, 968, 970, 972, 974, 976, 978, 980, 982, 984, 986, 988, 990, 992, 994, 996, 998, 1000, 1002, 1004, 1006, 1008, 1010, 1012, 1014, 1016, 1018, 1020, 1022, 1024, 1026, 1028, 1030, 1032, 1034, 1036, 1038, 1040, 1042, 1044, 1046, 1048, 1050, 1052, 1054, 1056, 1058, 1060, 1062, 1064, 1066, 1068, 1070, 1072, 1074, 1076, 1078, 1080, 1082, 1084, 1086, 1088, 1090, 1092, 1094, 1096, 1098, 1100, 1102, 1104, 1106, 1108, 1110, 1112, 1114, 1116, 1118, 1120, 1122, 1124, 1126, 1128, 1130, 1132, 1134, 1136, 1138, 1140, 1142, 1144, 1146, 1148, 1150, 1152, 1154, 1156, 1158, 1160, 1162, 1164, 1166, 1168, 1170, 1172, 1174, 1176, 1178, 1180, 1182, 1184, 1186, 1188, 1190, 1192, 1194, 1196, 1198, 1200, 1202, 1204, 1206, 1208, 1210, 1212, 1214, 1216, 1218, 1220, 1222, 1224, 1226, 1228, 1230, 1232, 1234, 1236, 1238, 1240, 1242, 1244, 1246, 1248, 1250, 1252, 1254, 1256, 1258, 1260, 1262, 1264, 1266, 1268, 1270, 1272, 1274, 1276, 1278, 1280, 1282, 1284, 1286, 1288, 1290, 1292, 1294, 1296, 1298, 1300, 1302, 1304, 1306, 1308, 1310, 1312, 1314, 1316, 1318, 1320, 1322, 1324, 1326, 1328, 1330, 1332, 1334, 1336, 1338, 1340, 1342, 1344, 1346, 1348, 1350, 1352, 1354, 1356, 1358, 1360, 1362, 1364, 1366, 1368, 1370, 1372, 1374, 1376, 1378, 1380, 1382, 1384, 1386, 1388, 1390, 1392, 1394, 1396, 1398, 1400, 1402, 1404, 1406, 1408, 1410, 1412, 1414, 1416, 1418, 1420, 1422, 1424, 1426, 1428, 1430, 1432, 1434, 1436, 1438, 1440, 1442, 1444, 1446, 1448, 1450, 1452, 1454, 1456, 1458, 1460, 1462, 1464, 1466, 1468, 1470, 1472, 1474, 1476, 1478, 1480, 1482, 1484, 1486, 1488, 1490, 1492, 1494, 1496, 1498, 1500, 1502, 1504, 1506, 1508, 1510, 1512, 1514, 1516, 1518, 1520, 1522, 1524, 1526, 1528, 1530, 1532, 1534, 1536, 1538, 1540, 1542, 1544,

7/25 60-70° 1 1/2 hr. aphidius 1 1/2 hr. Toxoptera - some host

$$^{(14)} \Delta = -2 \text{ parasite} + \Delta \cdot r^{(15)} \text{ natural balance} = 17.2 \quad (\text{man not})$$

making his effort)

Let it be supposed, a given

Oct. 13 / 5
1. ~~unfavorable to the enemy & favorable to the host.~~

S. incisa

chapter

Ecological conception of Insects.

§1. Temperature & Insect life.

Introduction. ^{etc} $\pm 1\%$ = ± 1 medium / temp. \therefore vital influence $\approx 1\%$.

i.e. growth, metamorphosis, reproduction & activity, number of generations, season of appearance, existence = directly or indirectly = effect z.n.

実験的=研究法から、最近では「マダ」の0.327%。

1907. Bachmetjew.: Experimentelle ~~Ento~~ Entomologische Studien vom Physikalisch-chemische Standpunkt. 77 S. 12.

生活技能 = 多客2 Temp. / general classification.

PaTemp, 产生活性能力最慢的这组. 活性最高者, 最在 rapid+temp.

7 optimum Temp. $\forall \text{ } \pm F = \text{max. min. Temp.}$

7条のちが。これとて、不明の系+1で507112=

(k) = \bar{T} Temperature limit + up point = 22.11

h. ultramaximum, ultraminimum 7

うき へん 44 = 4.47

Davenport is the zone + point 7 stop.

18. 22=34 次图, Hunter, zone, 外=

~~zone of~~ upper limit of effective temp.

(het. zone of activity & aestivation) + n

zone 5-17 31.

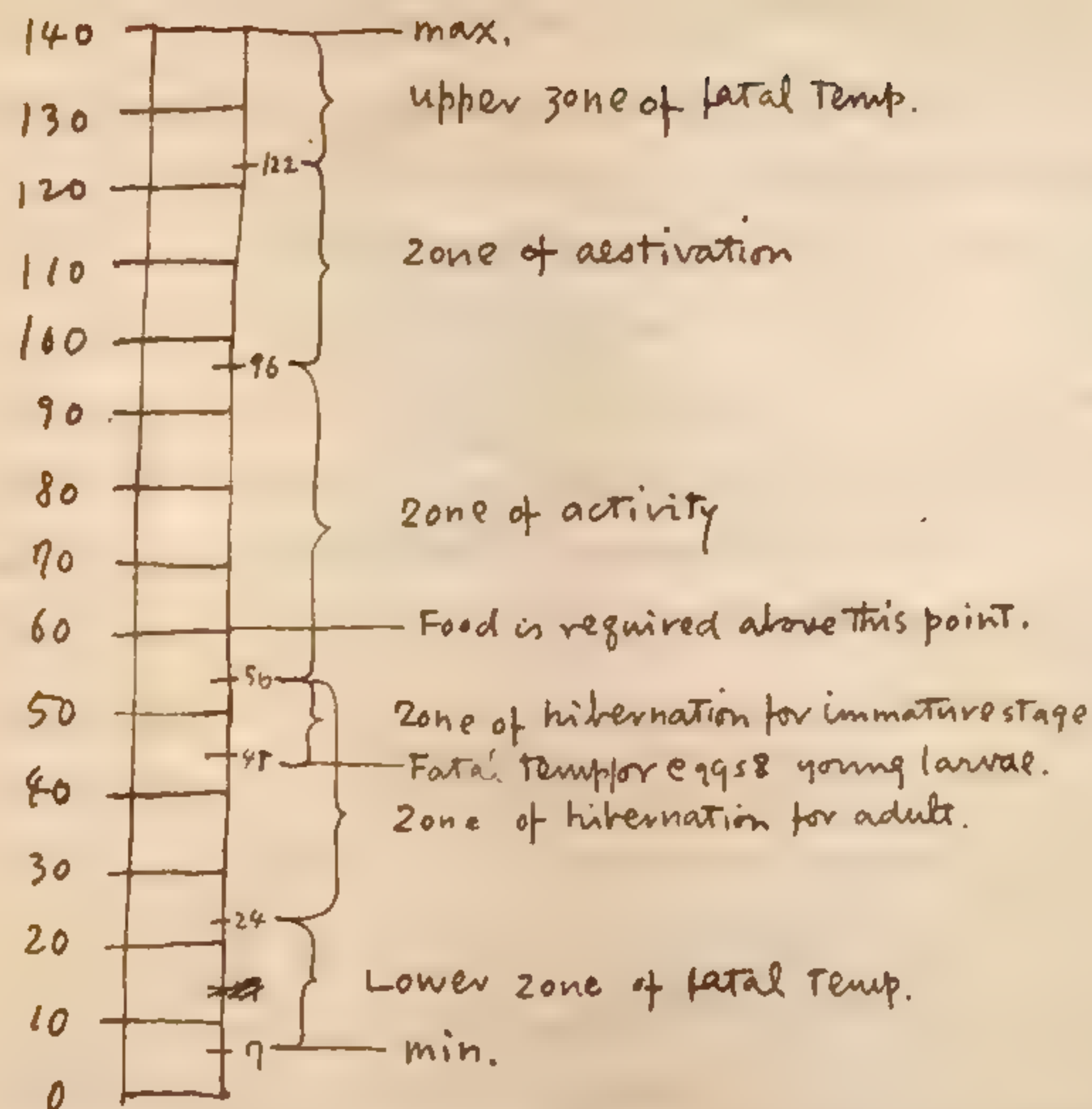
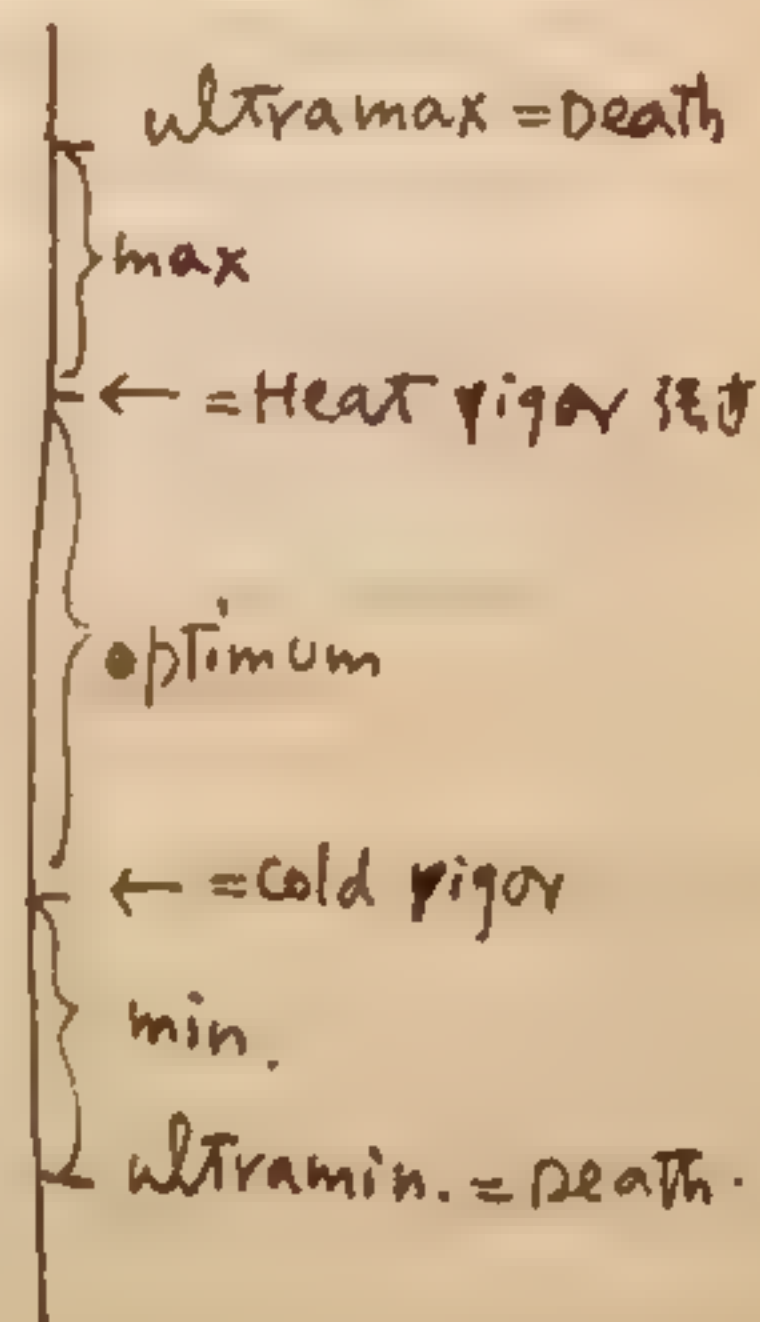


Diagram to illustrate the zone of Temp. in their relations to the activities of the ball neeril. (after Hunter & Pierce)

zone of activity i.e. effective Temp. / zone F.P. -.

aestivation, hibernation, zone 7 fix = 91E10712. point # species,
 stage, environment? 712

upper zone of fatal temp.: protein, coagulation pt. = 55°C. (直接回)

$$T_4 = 912 \text{ (2 田 6 7 4 10)}$$

lower zone " " " 原始岩 / 主成分为泥岩 / freezing pt. $\approx 5.5^\circ\text{C}$.

Vanessa levana	-12.8°
atolanta	-1.7
Cerambyx scopoli	-8.6
Dorcadion sp.	-2.4°
Aponia crataegi - pupa	-10.5°
Sphinx pinastri - pupa	-5.2°

chapter

§1. Temperature

- I) Introduction
- II) Modern temperature scales
- III) Studies of thermal limits
- IV) Physicochemical bases of Thermal injuries.

Temp. = heat / degree of heat.

heat = ... = ... heat property

ether, liquid ... radiant heat

heat = ... injuries ...

protoplasm, protoprotein, coagulation point, 50°-60°C

... 50°-60° = ...

1) molecular rearrangement.

2) mechanical destruction.

... heat of fusion.

superfusion. freezing pt. ...

Blagden's law ... salt contents, concentration = ...

freezing pt. ... cold ...

... spring ...

... ice formation = ...

... salt gehalt ...

... water extraction ...

... water content ...

... hibernation = ...

... water content ...

hibernation = ...

V) Velocity of chemical reaction and temperature.

amount of substance transformation / time = velocity = V

... chemical affinity = ... chemical resistance = ...

time = ... period ...

1st period. chemical reaction, ...

2nd ... molecule, rearrangement = ...

∴ 1st period ... concentration, function ... (law of mass action)

V = K C_a C_b ... molecule, concentration C_a, C_b ...

** or law of Guldberg and Waage.

... water, ... const + ... V = dx/dt = K(A-x) ...

1st period ... function of temperature ...

... Arrhenius' ... V₁/V₂ = (T₁-T₂)/2T₁T₂ ...

0°-10° = ... 10°-20° = ... Q₁₀ = Temperature coefficient ...

Van't Hoff's rule ...

... 2 < Q₁₀ < 3 ... chemical process ...

2nd period ... chemical resistance ...

... Temperature = ... molecule, lability ...

... resistance ...

Q₁₀ formula, log Q₁₀ = 10a log e a = const for the species.

or Q₁₀ = Time T₀ at 0° / Time T₀ at 0° ...

If at 0° 0° the time required for the transformation

T₁, T₂, Q₁₀ can be calculated from the following formula

$$\log Q_{10} = \frac{10}{Q_1 - Q_2} (\log T_2 - \log T_1)$$

$$Q_{10} = \left(\frac{T_2}{T_1} \right)^{\frac{10}{Q_1 - Q_2}}$$

Arrhenius

$$\frac{V_1}{V_2} = \frac{e^{T_1 - T_2}}{2T_1 T_2}$$

$$\frac{V_1}{V_2} = e c \left(\frac{1}{T_2} - \frac{1}{T_1} \right) \quad c = \text{constant for the species}$$

$$K_c Q = k e^{\frac{U}{R}} \left(\frac{T_1 - T_0}{T_2 - T_0} \right)$$

... reaction ...

* const. ...

Nov. 6.

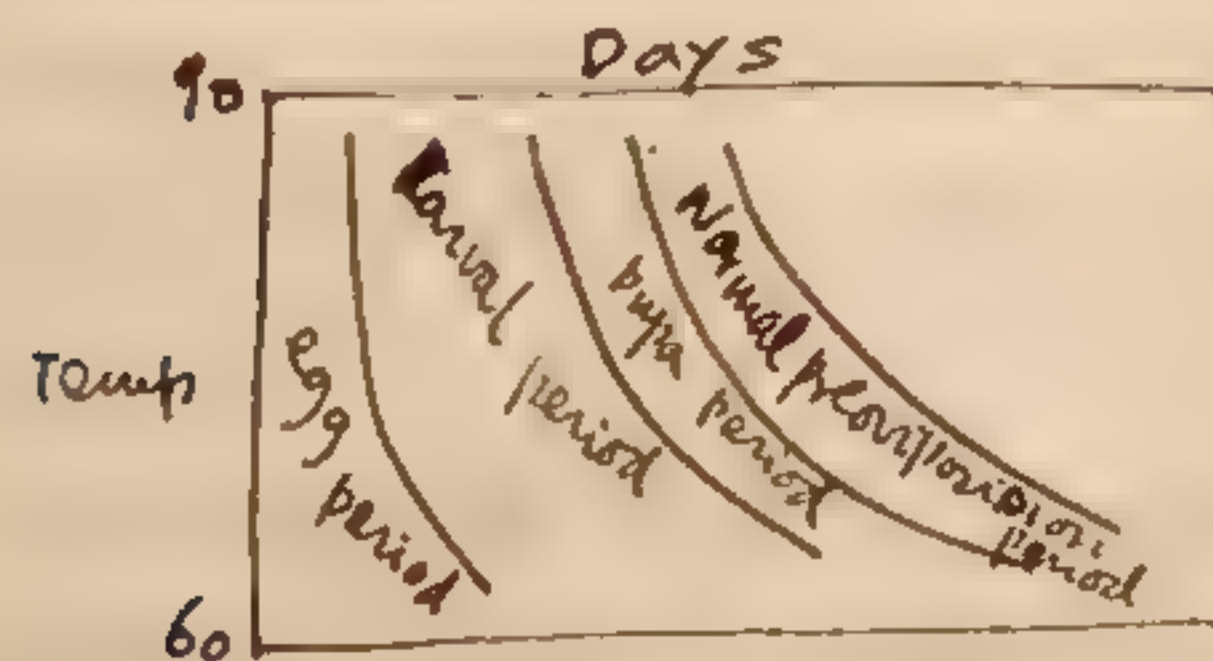
arrhenius, 1889, 1912 monomolecular reaction = 1st
straight line graph.

Krogh, 1914 = Van't Hoff law, 1st order reaction = 1st
straight line graph. 2nd order reaction, 2nd order reaction normal temperature (10°-25°) 1st

• = 1st order reaction.

$$V_{t+10} = V_t + 10K = V_t + K_{10}$$

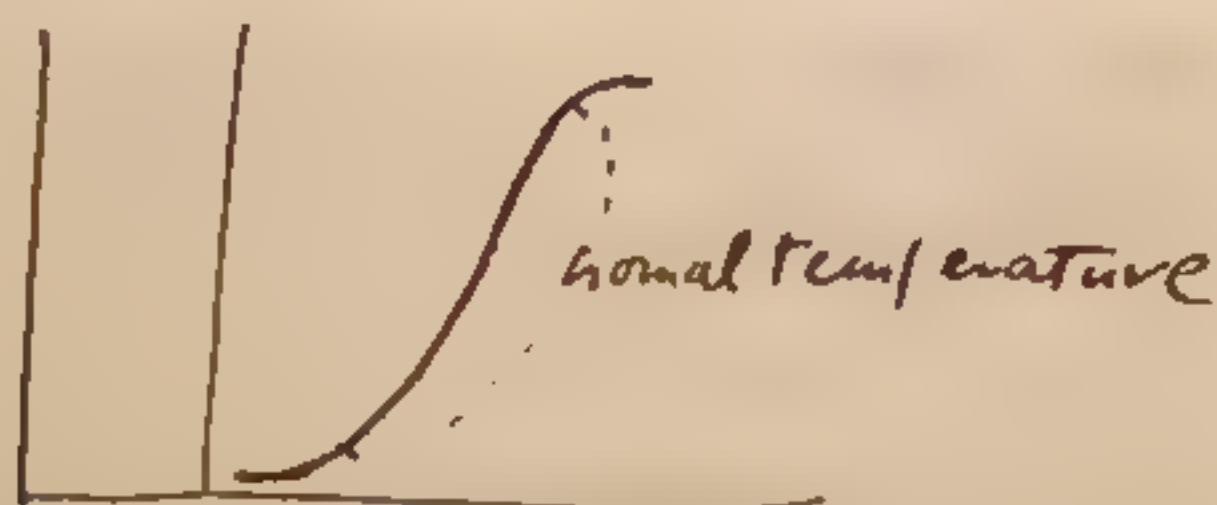
2nd straight line graph.



2nd order reaction = 2nd order reaction 2nd order reaction
ordinate = 2nd order reaction (2nd order)
the 1st order reaction = 1st order reaction
2nd order reaction

reciprocal curve. $V = \frac{1}{T}$ or $V = \frac{100}{T}$ or $V = \frac{1000}{T}$ VT = const.
development curve, hyperbola reciprocal curves sk. ln.

1st order reaction = 1st



2nd order reaction = 2nd order reaction 2nd order reaction
2nd order reaction = 2nd order reaction
2nd order reaction = 2nd order reaction

Nov. 10.

Factors	constant rel. humidity	I. const. temperature					Species
		50°	60°	70°	80°	90° F	
no. days from birth to maturity	75%	32	15	9	6	8	Toxoptera graminum (75% RH)
birth to death	75%	59	30	20	12	10	"
Daily rate of reproduction	75%	.9	—	2.6	3.1	1	"
no. days to first evidence of parasitism	75-100	18	—	5	4	4	Lysiphlebus trici (75% RH)
no. days to maximum emergence	75-100	43	—	10	10	—	"
no. days to maximum death	100	27	—	6	—	6	Blissus leucopterus (infected)
no. days to maximum death	100	46	—	11	—	6	" (uninfected)

Table II.

species no. individual	moisture	Temp.	Days from birth to maturity	Days from birth to death	Daily rate of reproduction
Toxoptera graminum 16	—	av. 60°F	19	76	1.4
T. g. 41	average 75.3%	av. 80.5°F	8	30	1.5
T. g. 28	constant 75%	const. 80°F	6	12	3.1

av. 2nd const. 1st order reaction = 1st order reaction

(Both Tables after Headlee 1914)

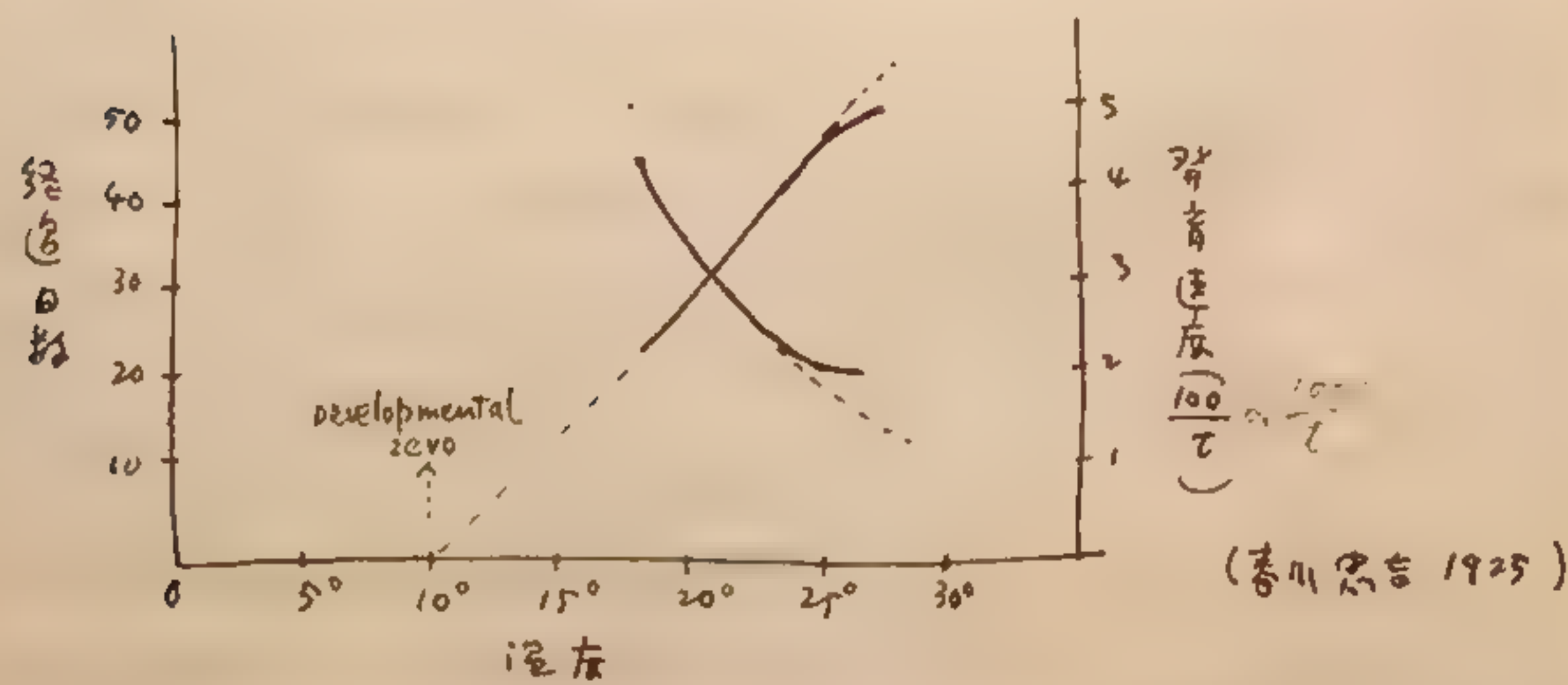
x time i.e. days required

Table III.

no. individuals	av. Temp.	Duration in Days (^{发育日数})	accumulated Effective Temp.	velocity of development ($\frac{1}{x} \times 100$)
10	18.2°C	44.1	358.3	2.2
10	22.5	30.0	377.6	3.3
10	24.5	24.8	358.8	4.0
9	26.2	22.2	371.5	4.5
10	26.3	22.0	356.8	4.5
9	28.3	20.7	380.1	4.8
10	29.1	19.9	382.3	5.0

Laspeyresia molesta Busck 梨姬心喙蛾 (春川忠吉 1925)

Temperature Development curves of *Laspeyresia molesta*.



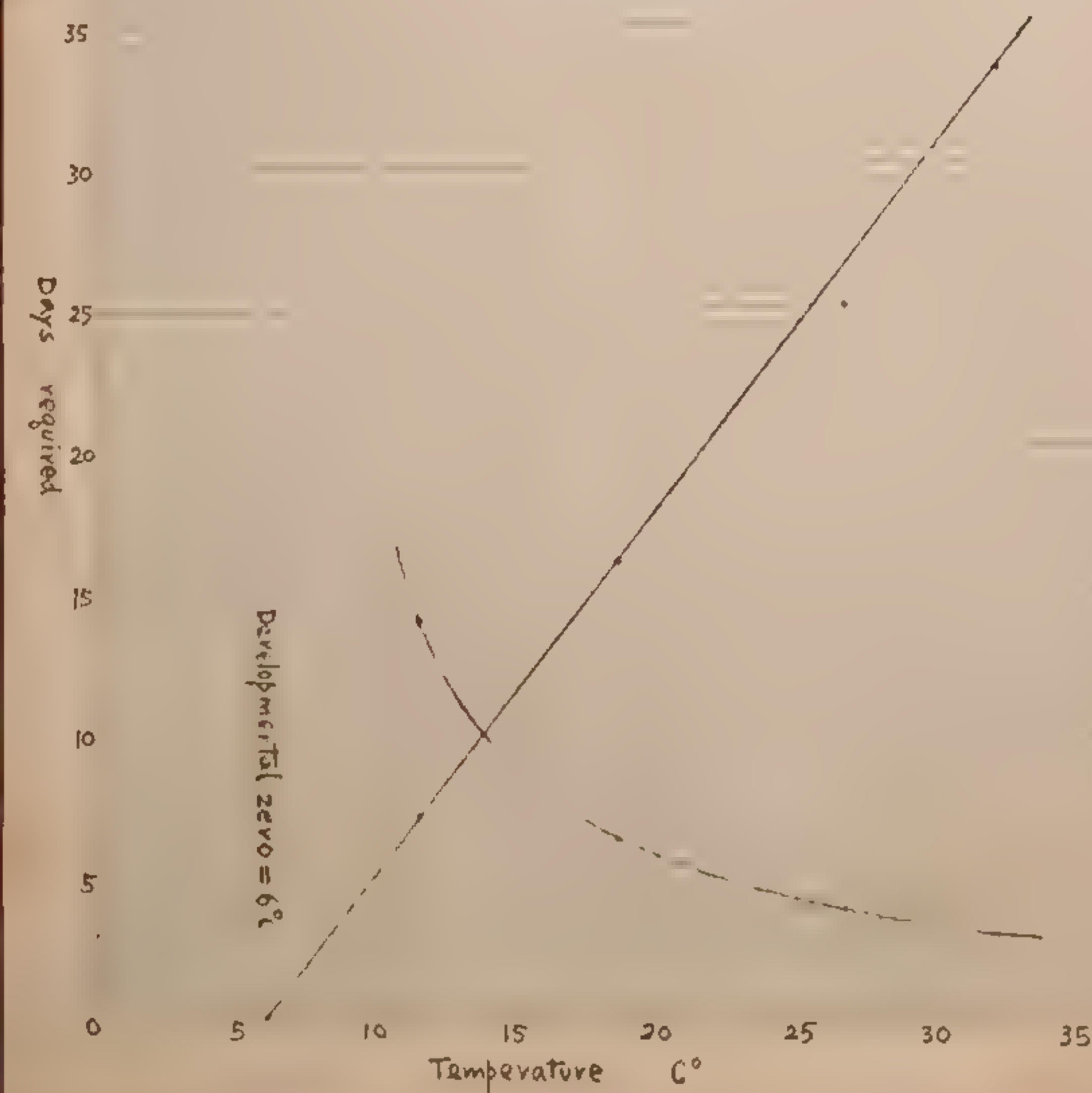
Thermal constant = acc. Effective temperature = 发育有效温度: 昆虫
发育一 stage 及 one generation 完成 必要之有效温度 SUM
意味之 发育有效温度 developmental zero 以上之有效温度 (发育日数) 之总和

developmental zero threshold at development rate, ...

x time 10. days required

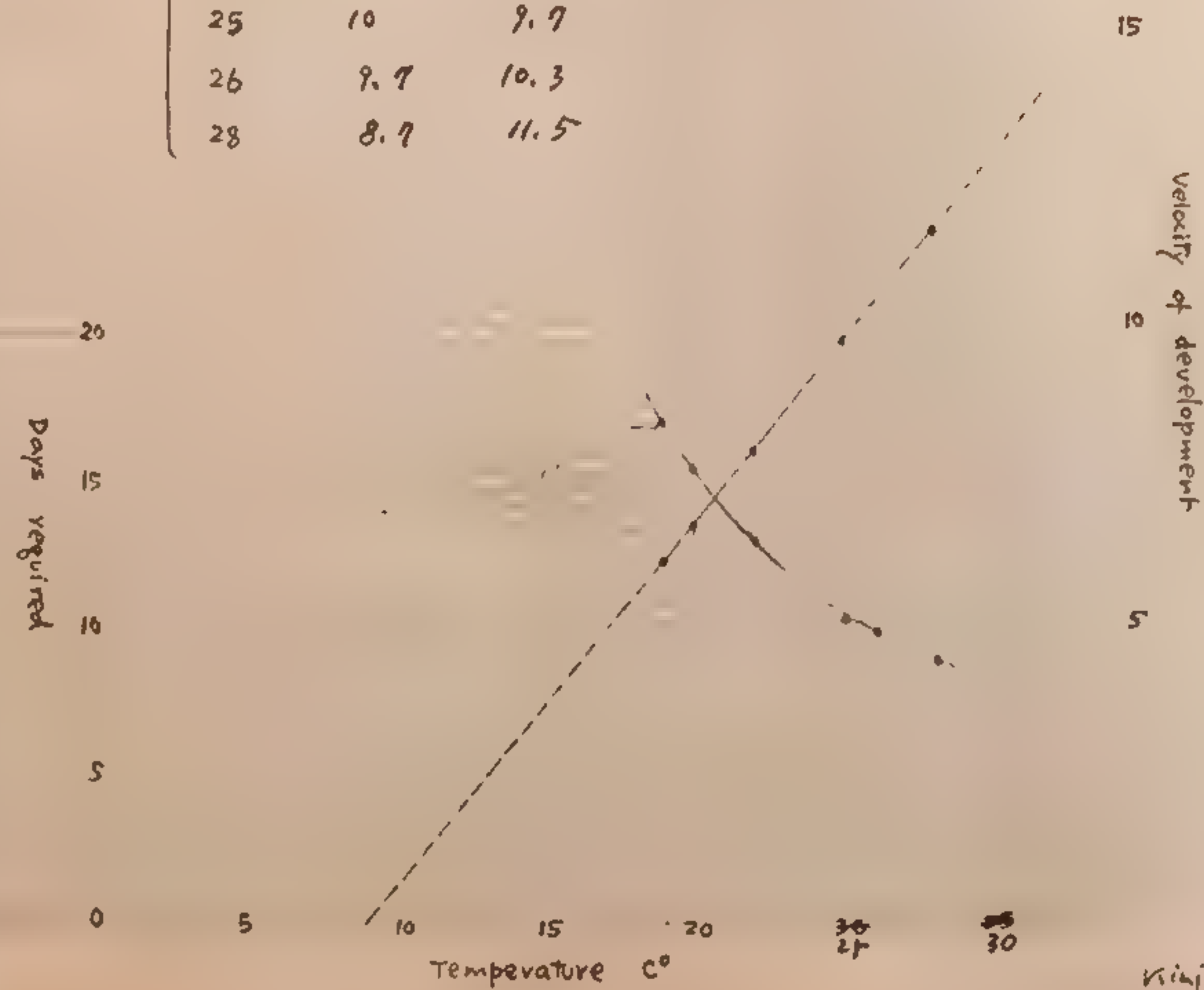
T. 11. 111

No. 1.



No. 2

Temp.	Days required	Velocity of development
20°C	15.1 ^B	6.6
22	12.8	7.8
25	10	9.7
26	9.7	10.3
28	8.7	11.5



Kinji Imanishi.

x Time 10 days required

Table. III

developmental zero = threshold of development. 全無1回 13度1 → 2° theoretically
 = 1/15等 發育ヲ起スルニ至リ 1° 1条ツ。 或ハツ、13度 = 直ニテ3/4ルヲ全無ヲ起スルニ至リ。
 ∴ 2. physiological zero, critical point 41.1 ± 1.4mm 普通 10° 10.0 ± 1.1回
 = 7.4.

1. Development of *Leptinotarsa decemlineata*
Hatching Eggs.

Temp. $^{\circ}\text{C}$	11.5°	13.6°	26.7°	22.2°
bars removed	-	6.2	7.0	1.0
velocity of development ($\frac{1}{t} \times 100$)	5	0	25	22.2
air temp.	5.5°	12.6°	20.7°	20.2°
$T - (T - D3)$				
thermal const $C \cdot T \times 100$	70.0	21.2	25.7	71.1
De. development, 12.5 = 0° C				

2. The activity of dehydrogenase in *Terrestrial molluscs* is a temperature dependent. 19° is the temperature at which the activity is highest. Is this too low? How long does the activity last at 19°? 38°? 58°?

Find the slope of the line passing through the points.

Draw the T-D curve and its reciprocal (T-V curve)

7- (2) $T_{\text{eff}} = \frac{1}{2} T_{\text{eff}} + \frac{1}{2} T_{\text{eff}}$ $T_{\text{eff}} = \frac{1}{2} T_{\text{eff}} + \frac{1}{2} T_{\text{eff}}$

1. The first part of the paper is devoted to the study of the properties of the function $f(x)$ defined by the equation

1. The first is the fact that the

1. Insect culture. Temperature important factor
 (see below)
 Temperature important sign factor. 34, 17, 25, 35
 2. Insect culture. Volatile + 25 + 35 + 45
 3. Insect culture. 35 + 45 + 55 + 65 + 75 + 85 + 95 + 105
 4. Insect culture. 35 + 45 + 55 + 65 + 75 + 85 + 95 + 105
 5. Insect culture. 35 + 45 + 55 + 65 + 75 + 85 + 95 + 105

6. Insect culture. 35 + 45 + 55 + 65 + 75 + 85 + 95 + 105
 7. Insect culture. 35 + 45 + 55 + 65 + 75 + 85 + 95 + 105
 8. Insect culture. 35 + 45 + 55 + 65 + 75 + 85 + 95 + 105
 9. Insect culture. 35 + 45 + 55 + 65 + 75 + 85 + 95 + 105
 10. Insect culture. 35 + 45 + 55 + 65 + 75 + 85 + 95 + 105

11. Insect culture. 35 + 45 + 55 + 65 + 75 + 85 + 95 + 105
 12. Insect culture. 35 + 45 + 55 + 65 + 75 + 85 + 95 + 105
 13. Insect culture. 35 + 45 + 55 + 65 + 75 + 85 + 95 + 105
 14. Insect culture. 35 + 45 + 55 + 65 + 75 + 85 + 95 + 105
 15. Insect culture. 35 + 45 + 55 + 65 + 75 + 85 + 95 + 105

16. Insect culture. 35 + 45 + 55 + 65 + 75 + 85 + 95 + 105
 17. Insect culture. 35 + 45 + 55 + 65 + 75 + 85 + 95 + 105
 18. Insect culture. 35 + 45 + 55 + 65 + 75 + 85 + 95 + 105
 19. Insect culture. 35 + 45 + 55 + 65 + 75 + 85 + 95 + 105
 20. Insect culture. 35 + 45 + 55 + 65 + 75 + 85 + 95 + 105

1. Insect culture. 35 + 45 + 55 + 65 + 75 + 85 + 95 + 105
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 4. Insect culture. 35 + 45 + 55 + 65 + 75 + 85 + 95 + 105
 5. Insect culture. 35 + 45 + 55 + 65 + 75 + 85 + 95 + 105

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Nov 17.

Chapter IV.

§2. Moisture and insect life.

moisture: Temperature, activity, habit, distribution, seasonal appearance, hibernation, etc., life: absolute necessary factor for life. 水は生物に必要で 70-90% の H₂O は protoplasm の main 成分で 0% のときは生命活動は不可能で 3% 以下では死に至る。水は生命に必要で 70-90% の H₂O は protoplasm の main 成分で 0% のときは生命活動は不可能で 3% 以下では死に至る。

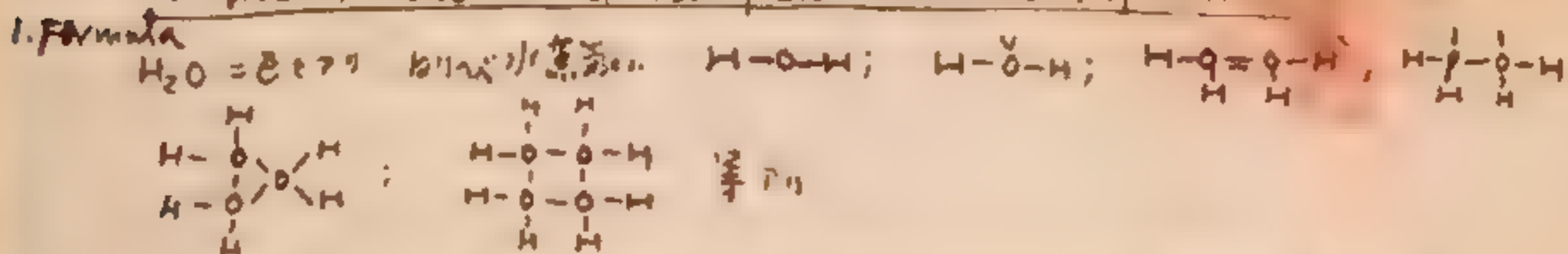
moisture — 湿度 = 空気中の水蒸気量 / 飽和蒸気量 × 100%
relative humidity, 相対湿度

$$R.H = \frac{f}{F}$$

f = present quantity of water vapour at the temperature T .
 F = quantity of water vapour saturated at the same temperature T .

(1) Introduction

Physical, chemical & biological constitution of water



2. Specific heat. 水の比熱は 1 カロリーで 1 グラムの水を 1℃ 上げるのに必要。これは他の液体よりも高い。これは水分子の構造と関係がある。水分子は二つの水素原子と一つの酸素原子で構成されている。酸素原子は二つの水素原子と共有結合を形成している。これは水分子の構造と関係がある。

3. Power of solution. 水は多くの物質を溶解することができる。これは水分子の構造と関係がある。水分子は二つの水素原子と一つの酸素原子で構成されている。酸素原子は二つの水素原子と共有結合を形成している。これは水分子の構造と関係がある。

4. Specific inductive capacity (dielectric constant) 水の誘電率は約 80 である。これは水分子の構造と関係がある。水分子は二つの水素原子と一つの酸素原子で構成されている。酸素原子は二つの水素原子と共有結合を形成している。これは水分子の構造と関係がある。

ecological meaning

- great medium of life. 水は生命の媒体である。これは水分子の構造と関係がある。水分子は二つの水素原子と一つの酸素原子で構成されている。酸素原子は二つの水素原子と共有結合を形成している。これは水分子の構造と関係がある。
- no water, no life for. 水がないと生命は存在しない。これは水分子の構造と関係がある。水分子は二つの水素原子と一つの酸素原子で構成されている。酸素原子は二つの水素原子と共有結合を形成している。これは水分子の構造と関係がある。
- water as injurious agent. 水は有害な要因である。これは水分子の構造と関係がある。水分子は二つの水素原子と一つの酸素原子で構成されている。酸素原子は二つの水素原子と共有結合を形成している。これは水分子の構造と関係がある。

(2) Water and Development (metabolism) of insects.

moisture = 湿度 = 空気中の水蒸気量 / 飽和蒸気量 × 100%
Davenport (1899) 水は昆虫の生活に必要で 70-90% の H₂O は protoplasm の main 成分で 0% のときは生命活動は不可能で 3% 以下では死に至る。水は生命に必要で 70-90% の H₂O は protoplasm の main 成分で 0% のときは生命活動は不可能で 3% 以下では死に至る。

Nov. 21.

Bachmetjew (1907) 昆虫の最適湿度は 70-80% である。これは水分子の構造と関係がある。水分子は二つの水素原子と一つの酸素原子で構成されている。酸素原子は二つの水素原子と共有結合を形成している。これは水分子の構造と関係がある。

species = 種。これは水分子の構造と関係がある。水分子は二つの水素原子と一つの酸素原子で構成されている。酸素原子は二つの水素原子と共有結合を形成している。これは水分子の構造と関係がある。

Headlee (1914) 昆虫の最適湿度は 70-80% である。これは水分子の構造と関係がある。水分子は二つの水素原子と一つの酸素原子で構成されている。酸素原子は二つの水素原子と共有結合を形成している。これは水分子の構造と関係がある。

湿度 (or metabolism rate) 湿度は昆虫の代謝率に影響を与える。これは水分子の構造と関係がある。水分子は二つの水素原子と一つの酸素原子で構成されている。酸素原子は二つの水素原子と共有結合を形成している。これは水分子の構造と関係がある。

Table I. *Toxoptera graminum* at 80°F const. Temp. & 70% rel. Humidity

constant rel. Humidity in %	37	50	70	80	100	no. of days from birth to maturity
	6	6	6	6	6	

Table II. *Blissus leucopertus*. Temp. 70°F. const.

Humidity %	40	60	80	100
no. of days from infection (fungus) to max. death	10	10	10	10
no. of days from beg. of exp. beginning of experiment to max. death	11	11	11	11

on succulent food & high moisture. これは水分子の構造と関係がある。水分子は二つの水素原子と一つの酸素原子で構成されている。酸素原子は二つの水素原子と共有結合を形成している。これは水分子の構造と関係がある。

Laspeyresia molesta — Haver 1925

Hatching of egg	no. of egg	no. of hatched	% hatched
Hum. 10%	97	47	49.4%
35%	83	69	83.1%
65%	49	49	100.0%
pupal stage	no. of larva	adult emerged	% emerged
10%	36	24	66.6%
35%	32	31	96.8%
65%	35	33	94.3%

Initial molting = 2.42 moisture, 43%

Dispheromera femorata (Faomidae) — Severin 1910.

	<u>Kept on wet sand</u>	<u>Kept dry</u>
no. of eggs hatched	200	200
emerged completely	174	12
	transferred from wet to dry condition	transferred from dry to wet
no. of eggs hatched	100	100
emerged completely	8	80
failed to get free	92	20

Effects on development of larva

Bruchus obtectus (Bean weevil) Headlee

Humidity	no. days from oviposition to transformation to pupa.	
21%	33.8	
25.9	30.1	
37.0	28.2	
45.7	26.6	
56.1	24.7	
73.4	21.6	
80.0	19.4	
89.7	17.7	Fungus = "Jk x
100.0	19.6	
1	non develop.	

Lifecycle of bean weevil.

	100%	69.3	62.0	59.4	44.1	39.9	26.0	20.5	1
no. days from max. emergence of 1st generation to that of 2 nd gen.	29	23	31	39	27	41	reproduction stopped		
no. adults at start (I gen.)	156	25	25	129	25	15	25	25	25
no. adults at end (II gen.)	641	129	101	27	11	14	0	0	0

* Fecundity, 減 λ = 毛虫が次世代に作り出す卵の数。若虫がカタイbeans / 中 = 入 λ タイ = 3枚コナラ

(4) Theories of the effects of moisture.

Nov. 24
105 plank.

Headline / ~~main~~ / conclusion

- [illegible]

1. Bachmayer.

i pupal transformation - extraction of water beneficial. i.e. 蚕矢 1937.

low. hum. $1 + \frac{2}{3} \xi$ rapid. 20. Transformation = $\frac{1}{2} \frac{1}{\xi} / 1 + \frac{1}{2} + \frac{1}{2} \xi / 1 + \frac{1}{2} + \frac{1}{2} \xi$

ii pupa in cocoon. 幼虫の蛹 (1週間) = 2週間後. 水 = 14日 経て rapid. =

1. pH 7.2, CO_2 2.0% (v/v), O_2 2.0% (v/v), N_2 96.0% (v/v), H_2 0.0% (v/v), CH_4 0.0% (v/v), H_2S 0.0% (v/v).

2. Headlee. — theory of interval water-optimum. 体/水/水/水 = 1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78. 79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94. 95. 96. 97. 98. 99. 100. 101. 102. 103. 104. 105. 106. 107. 108. 109. 110. 111. 112. 113. 114. 115. 116. 117. 118. 119. 120. 121. 122. 123. 124. 125. 126. 127. 128. 129. 130. 131. 132. 133. 134. 135. 136. 137. 138. 139. 140. 141. 142. 143. 144. 145. 146. 147. 148. 149. 150. 151. 152. 153. 154. 155. 156. 157. 158. 159. 160. 161. 162. 163. 164. 165. 166. 167. 168. 169. 170. 171. 172. 173. 174. 175. 176. 177. 178. 179. 180. 181. 182. 183. 184. 185. 186. 187. 188. 189. 190. 191. 192. 193. 194. 195. 196. 197. 198. 199. 200. 201. 202. 203. 204. 205. 206. 207. 208. 209. 210. 211. 212. 213. 214. 215. 216. 217. 218. 219. 220. 221. 222. 223. 224. 225. 226. 227. 228. 229. 230. 231. 232. 233. 234. 235. 236. 237. 238. 239. 240. 241. 242. 243. 244. 245. 246. 247. 248. 249. 250. 251. 252. 253. 254. 255. 256. 257. 258. 259. 260. 261. 262. 263. 264. 265. 266. 267. 268. 269. 270. 271. 272. 273. 274. 275. 276. 277. 278. 279. 280. 281. 282. 283. 284. 285. 286. 287. 288. 289. 290. 291. 292. 293. 294. 295. 296. 297. 298. 299. 300. 301. 302. 303. 304. 305. 306. 307. 308. 309. 310. 311. 312. 313. 314. 315. 316. 317. 318. 319. 320. 321. 322. 323. 324. 325. 326. 327. 328. 329. 330. 331. 332. 333. 334. 335. 336. 337. 338. 339. 340. 341. 342. 343. 344. 345. 346. 347. 348. 349. 350. 351. 352. 353. 354. 355. 356. 357. 358. 359. 360. 361. 362. 363. 364. 365. 366. 367. 368. 369. 370. 371. 372. 373. 374. 375. 376. 377. 378. 379. 380. 381. 382. 383. 384. 385. 386. 387. 388. 389. 390. 391. 392. 393. 394. 395. 396. 397. 398. 399. 400. 401. 402. 403. 404. 405. 406. 407. 408. 409. 410. 411. 412. 413. 414. 415. 416. 417. 418. 419. 420. 421. 422. 423. 424. 425. 426. 427. 428. 429. 430. 431. 432. 433. 434. 435. 436. 437. 438. 439. 440. 441. 442. 443. 444. 445. 446. 447. 448. 449. 450. 451. 452. 453. 454. 455. 456. 457. 458. 459. 460. 461. 462. 463. 464. 465. 466. 467. 468. 469. 470. 471. 472. 473. 474. 475. 476. 477. 478. 479. 480. 481. 482. 483. 484. 485. 486. 487. 488. 489. 490. 491. 492. 493. 494. 495. 496. 497. 498. 499. 500. 501. 502. 503. 504. 505. 506. 507. 508. 509. 510. 511. 512. 513. 514. 515. 516. 517. 518. 519. 520. 521. 522. 523. 524. 525. 526. 527. 528. 529. 530. 531. 532. 533. 534. 535. 536. 537. 538. 539. 540. 541. 542. 543. 544. 545. 546. 547. 548. 549. 550. 551. 552. 553. 554. 555. 556. 557. 558. 559. 560. 561. 562. 563. 564. 565. 566. 567. 568. 569. 570. 571. 572. 573. 574. 575. 576. 577. 578. 579. 580. 581. 582. 583. 584. 585. 586. 587. 588. 589. 590. 591. 592. 593. 594. 595. 596. 597. 598. 599. 600. 601. 602. 603. 604. 605. 606. 607. 608. 609. 610. 611. 612. 613. 614. 615. 616. 617. 618. 619. 620. 621. 622. 623. 624. 625. 626. 627. 628. 629. 630. 631. 632. 633. 634. 635. 636. 637. 638. 639. 640. 641. 642. 643. 644. 645. 646. 647. 648. 649. 650. 651. 652. 653. 654. 655. 656. 657. 658. 659. 660. 661. 662. 663. 664. 665. 666. 667. 668. 669. 670. 671. 672. 673. 674. 675. 676. 677. 678. 679. 680. 681. 682. 683. 684. 685. 686. 687. 688. 689. 690. 691. 692. 693. 694. 695. 696. 697. 698. 699. 700. 701. 702. 703. 704. 705. 706. 707. 708. 709. 710. 711. 712. 713. 714. 715. 716. 717. 718. 719. 720. 721. 722. 723. 724. 725. 726. 727. 728. 729. 730. 731. 732. 733. 734. 735. 736. 737. 738. 739. 740. 741. 742. 743. 744. 745. 746. 747. 748. 749. 750. 751. 752. 753. 754. 755. 756. 757. 758. 759. 760. 761. 762. 763. 764. 765. 766. 767. 768. 769. 770. 771. 772. 773. 774. 775. 776. 777. 778. 779. 780. 781. 782. 783. 784. 785. 786. 787. 788. 789. 790. 791. 792. 793. 794. 795. 796. 797. 798. 799. 800. 801. 802. 803. 804. 805. 806. 807. 808. 809. 810. 811. 812. 813. 814. 815. 816. 817. 818. 819. 820. 821. 822. 823. 824. 825. 826. 827. 828. 829. 830. 831. 832. 833. 834. 835. 836.

metabolic water. 体液 = 供给 + 代谢. external + internal + supply p.p.

external :: imbibed, taken in with food, etc. internal :: i.e. metabolic water etc.

source of metabolic water {

- i 食物及呼吸: 呼吸作用 (呼吸作用 $O_2 = 20L$)
- ii anaerobic oxidation (无氧呼吸: 无氧呼吸 $O_2 = 9$)
- iii chemical transformation (化学转化: 化学转化 $O_2 = 2L$)

→ molecule / 分子式 / 分子

i, ii CO_2 が必要 iii. 水 + 土. が \rightarrow 土中の H_2O と CO_2 met. water である.

met. water / 土 = 水が土中を移動する速度 = 対数.

1 stage / insect, 2 stage ... 一定 optimum p.p. 1 1/2 中: 全 20 個 1 個は 1 個

物理的 & 化学的 process を 2 種類に分ける. 1 個は 1 個

hum. 1 個は 1 個 two direct way p.p. ; 1 個は 1 個 1 個は 1 個

internal optimum p.p. = 水 + 土 + 土. dry air 5% 7% 10% opp. 14% 15%
moist air 15% 20% 25% 30% 35% 40% 45% 50% 55% 60% 65% 70% 75% 80% 85% 90% 95% 100%

internal opt. = 1 個は 1 個 dry air 11 opt. 12% = 1 個は 1 個

1 個は 1 個 moist air = 1 個は 1 個 dry air

3. water optimum, 1 個は 1 個 ground - 1 個は 1 個 (5 = death)

4. moist air = continuous exposure to 1 個は 1 個 下海 1 個は 1 個

(6) Miscellaneous relations

Influence of soil moisture on the development of aphid colonies.

sugar beets species. Pemphigus betae. Poplar 1 個は 1 個

sugar beet = 1 個は 1 個 migrants. 1 個は 1 個

Table

moisture condition	no. beets grown	conditions of beets at harvest				% infection injury	
		uninfested	infested slightly	badly	seriously	infection	injury
fairly dry	43.901	9.226	27.073	5.950	3.652	83.5	21.9
fairly moist	48.342	23.704	21.069	2.655	784	50.7	8.1
		ave. sugar content %		total yield in lbs			
fairly dry		15.2		25.587			
fairly moist		16.4		30.833			

(6) Economic significance.

1. Dryness.

Headlee: Bruchus obtectus (2 x 1 1/2 in)

Treatment amount of H_2SO_4	total no. beans	total no. holes.	no. holes per bean
.01 cc	36	164	4.5
.03	26	43	1.6
.05	20	158	7.9
.10	23	230	10.0
.25	24	116	4.8
.60	22	61	2.7
1.00	26	54	2.0
5.00	22	0	0
10.00	134	0	0
no. acid	35	236	6.7

(in 1000 cc jar)

横山桐郎: Derines coarctatus トビカツグシ 4 シ

i 成虫 56-58°C fatal temperature である.

ii 乾燥 = 乾燥 - 乾燥 1 個は 1 個 species = 2 個は 2 個

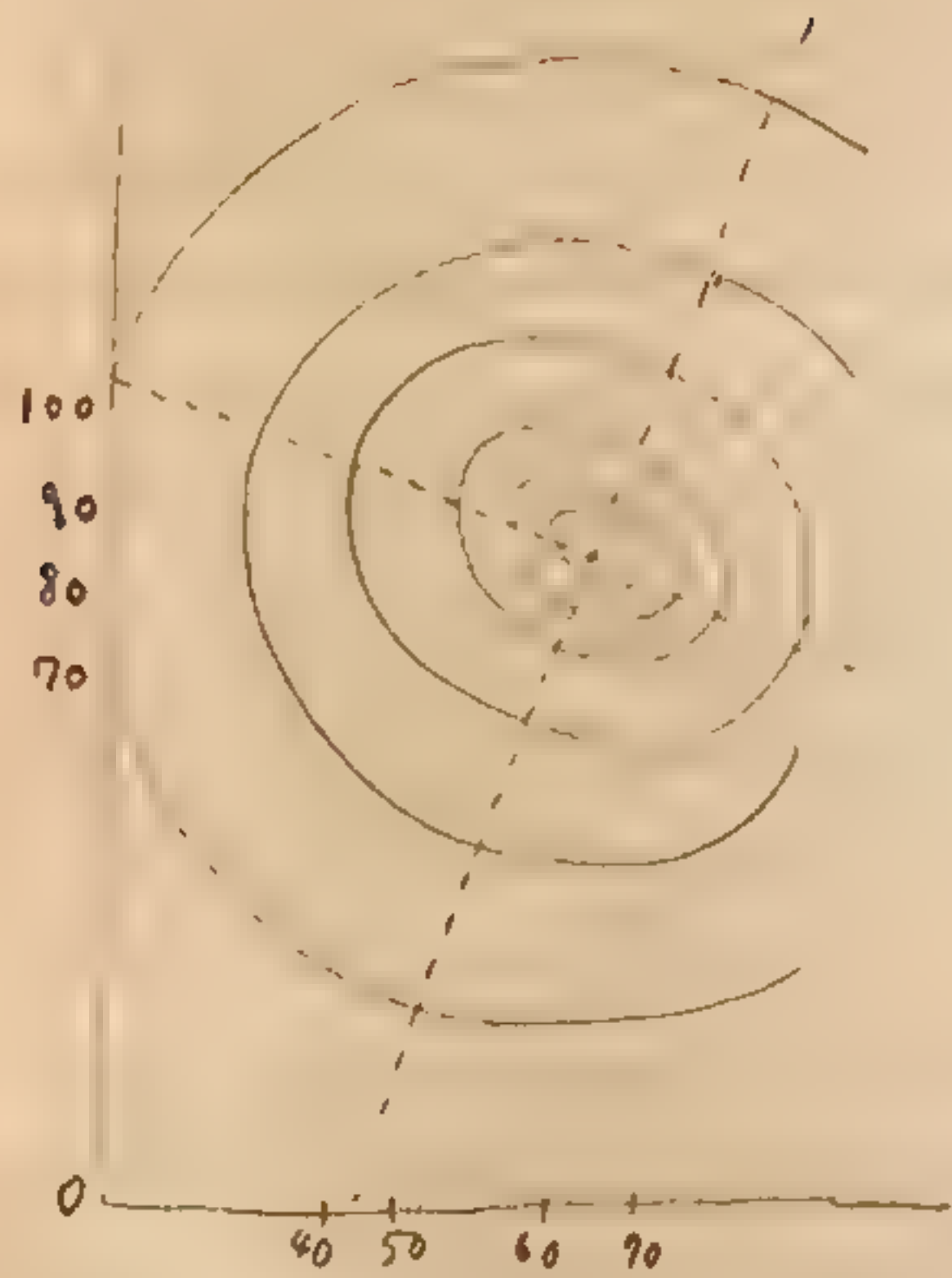
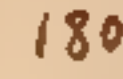
iii Dry heat = 乾燥 - 乾燥 1 個は 1 個 pupa < adult < larva.

iv " sex = 2 個は 2 個 ♀ > ♂



47 点 $\bar{7}'' + 7. -$

iv Thermal constant $\approx 12 \pm 3\%$. DA is modify \rightarrow better.



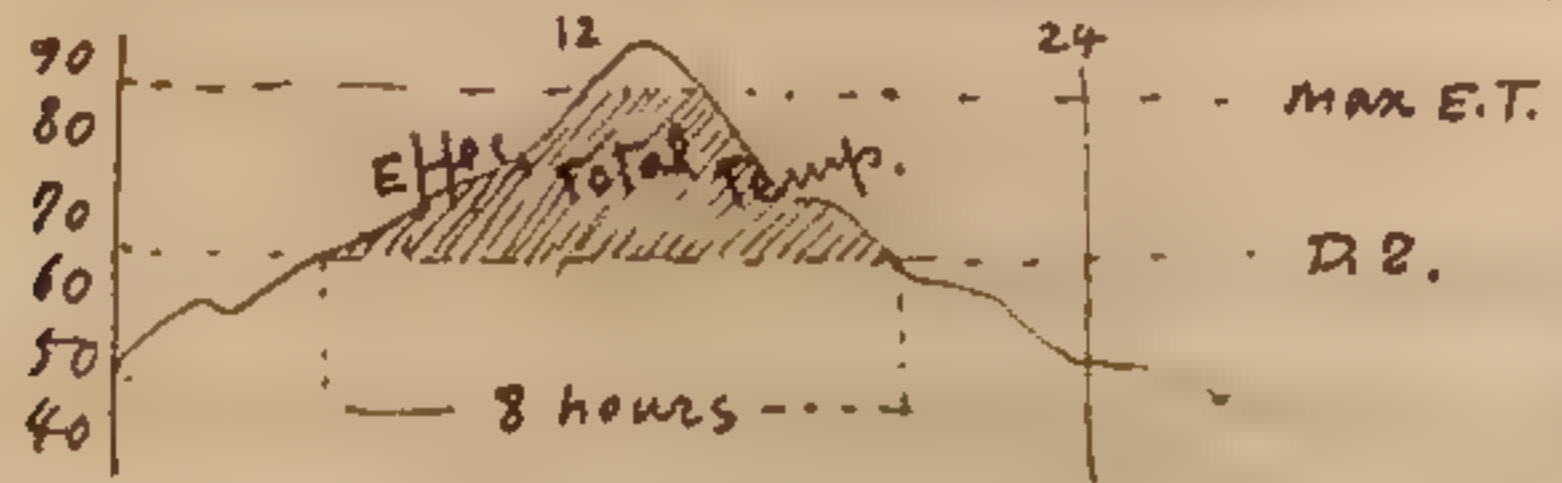
center n. species = 物种
center = 中心 ~~the~~ ellipsoidal
= curve + n. i.e. temperature
= humidity, 方方 range +
top.

原因, 物种 + 生物全体 = 大样本
一致 + 中心.

(4). New thermal constant.

thermal const. \times time unit \rightarrow thermal unit (develop. zero 12E) / 積算デグ・時 (p.22) 6
humidity 湿度 \times rule \rightarrow rule \rightarrow 2,000 6.2.2.
其中, P.L stage \times life circle \rightarrow accomplish \times 必要 \times constant total
effective Temp. \rightarrow ~~humidity~~ humidity = 51% effective time unit \rightarrow effective
temperature / ~~ne~~ \rightarrow ne, 中 \rightarrow P.L. 温度, unit \rightarrow 積算デグ.

131. 60% humidity. 50° - 90° F 65° =zero of E.T. 85° =maximum of E.T.
 65° - 85° =8 hours. thermal constant for this day?



$$\text{Ans: } 8 \times \frac{85-65}{2} = 80 //$$

Total stage = 241711.57106 + 211520
= 453231.57106

Dec. 7.

4. Light.

(1) introduction
光の活動 = 影響 = coloration + 形質 = 1度1度アリ。又有害なアリ。有害な

的、研究は330+3

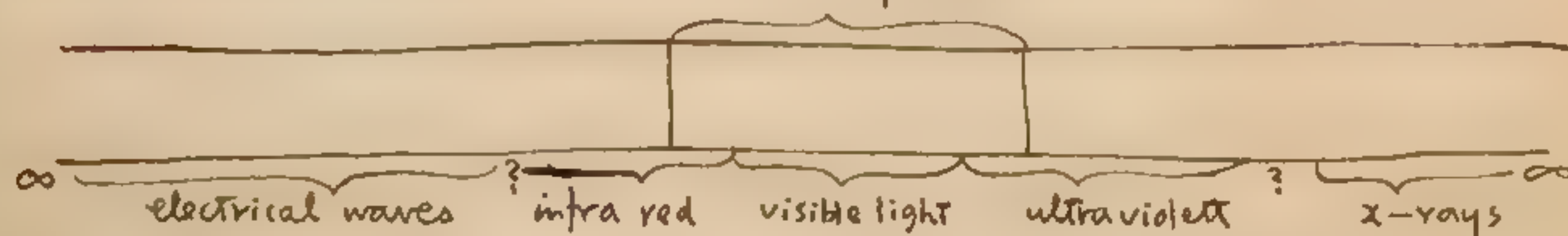
(2) what is light? 光は radiation / 一ツツアル。ether / 波動アリ。光は

sun 光. ether wave = { electrical
infra-red / 1度1度アリ。光は
light
ultra-violet

光 = 200 / 1000 光年 = 700 electro-magnetic spectrum / 一ツツアル。光は

electro magnetic spectrum

solar spectrum



wave length	electrical waves	3 mm — ∞
	infra-red	0.06 — 0.00078
	light	0.00076 — 0.00038
	ultra violet	0.00038 — 0.0001 — ?
	x-rays	0.1 μm — 10 μm

red: 波長 7 unit + 200



radiant energy 300 nm — 730 nm

light の 光熱 工 + 工 = 工 工 工

(3) physical phenomena, some chemical

Grothius's law 吸収 + 300 光年 / 1000 光年 = 2000

$$E = \frac{1}{d} \dots \dots E: \text{extinction coefficient}$$

Lambert's law 吸収 + 300 光年 / 1000 光年 = 2000

$$I = I_0 e^{-\mu d} \dots \dots I: \text{intensity after absorption} \quad I_0: \text{original intensity}$$

d : thickness of absorbing medium μ : absorption index

Beer's law 1/1000 光年 / 1000 光年 = 2000

Bunsen-Roscoe law Effect = Kit i : intensity

Resonance 結合 + 物質の electron 300 + 1. 1/1000 光年 = 2000

vibration 7 + 2 結合 + light の resonance 7 + 2. 2000 光年 / 1000 光年

結合 effect + 100. (photochemical change)

photochemical change

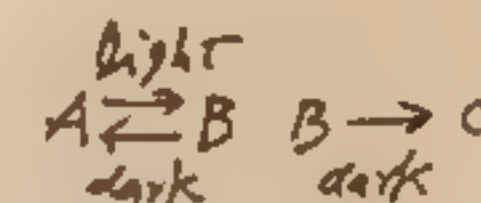
i 工 工 工 + 1000 光年 / 1000 光年 = 2000

ii " 結合 + 1000 光年 / 1000 光年 = 2000

iii coupled reaction with loss energy

iv catalytic "

a. catalyst 結合 + 1000 光年 / 1000 光年 = 2000
b. " lasts after illumination



(4) Biological & ecological consideration of light.

infrared ... thermal (most intense)

red ... " 結合, photosynthesis = 2000 光年 / 1000 光年

blue-green ... phototaxis 結合 + 1000 光年 / 1000 光年 = 2000

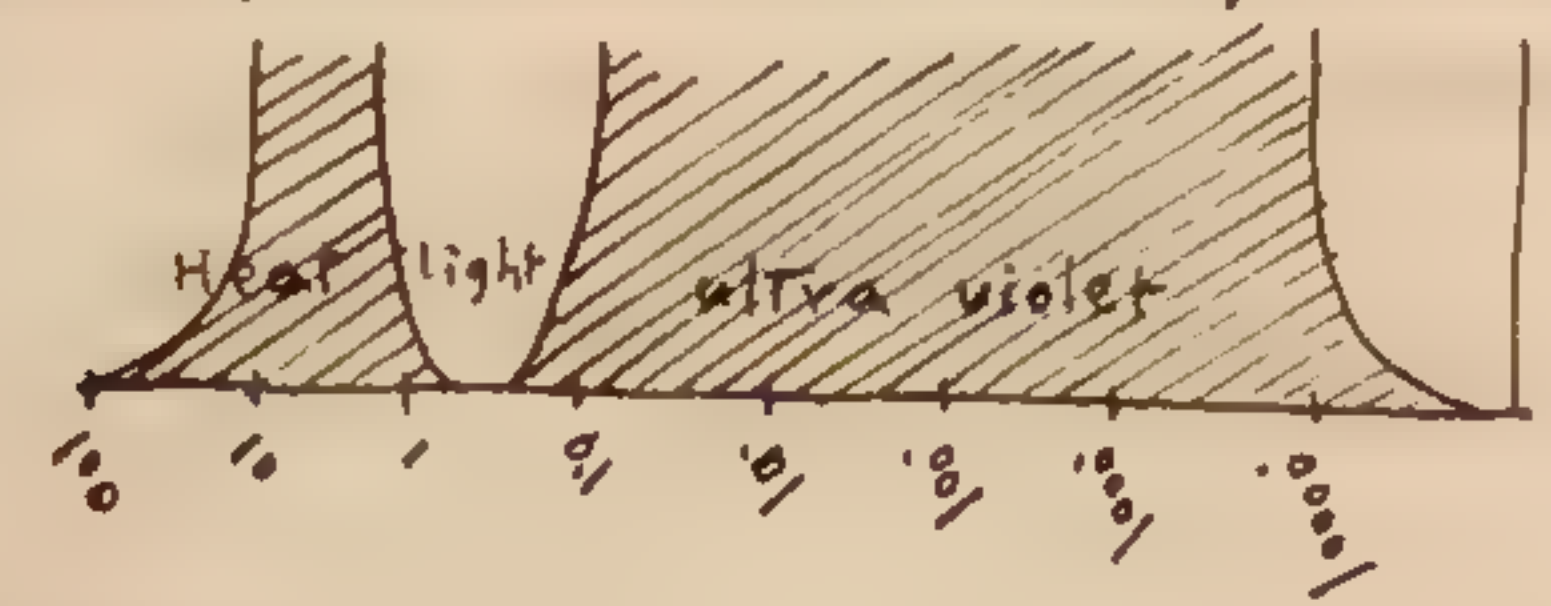
Dec. 11.

ultra violet ... chemical 紫外線は化学的な作用を起す visible light

= 可視光線より波長が短い

absorption of protoplasm. 特 = protoplasm, 吸収する

infra red, 100, ultra violet visible light を吸収する



ultra violet 光は化学的な作用を起す 紫外線は化学的な作用を起す

chemical effect (or change)

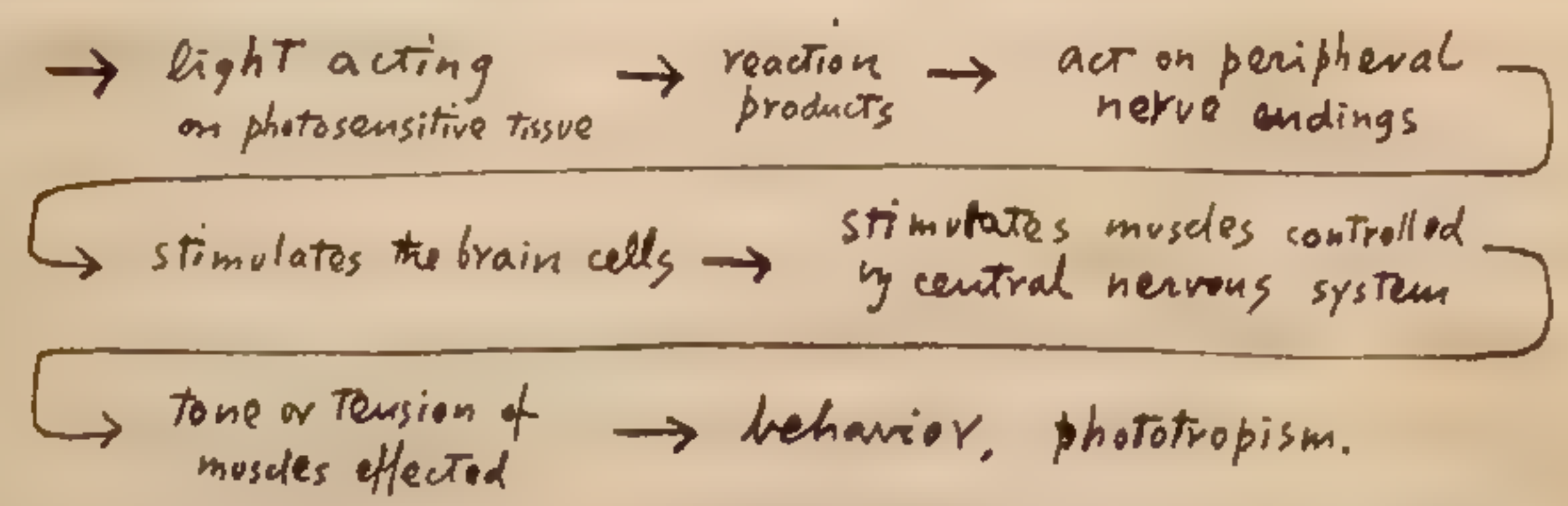


photo reaction { photokinesis ... activity 活動性 i.e. kinetic.
phototropism ... orientation 方向性 i.e. directive.

15] phototropism, theory

A. mode of action

- i continuous action theory ... Loeb.
- ii change of intensity theory ... Jennings, Mast.

B. Cause of action

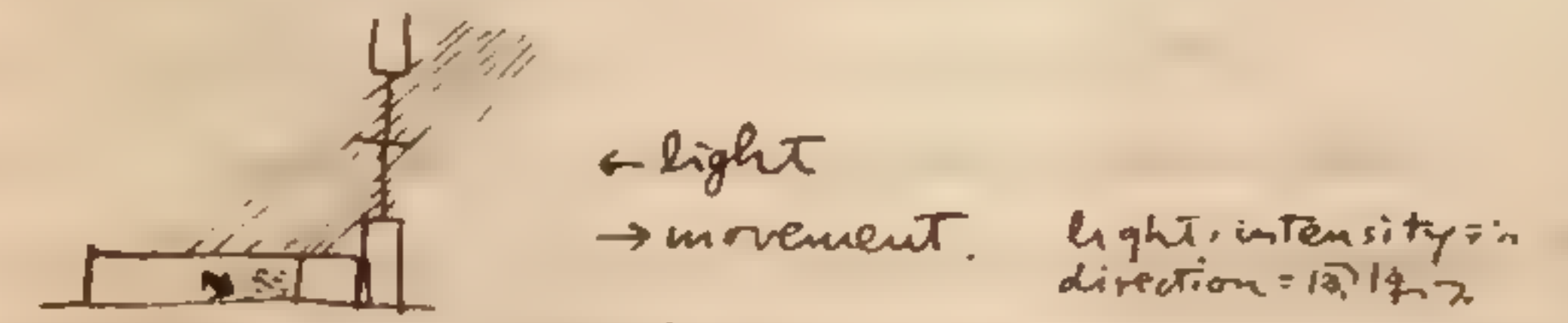
- i anthropomorphic ... Graber
- ii mechanistic ... Loeb.

[6] Experimental Data

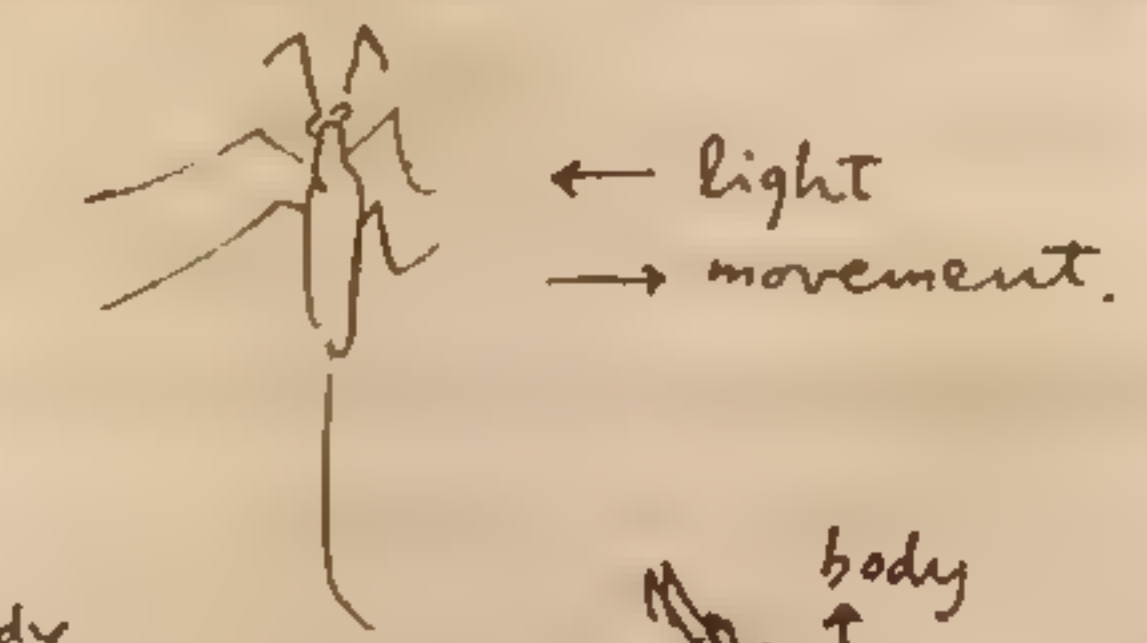
1. Heliotropism (= Phototropism)

Loeb, 実験 植物は光に向かって Helio positive (photopositive)
植物は光から離れて Helio negative (photohegative)

Helio positive 植物は光に向かって 134 Porthezia chrysorrhoea larva



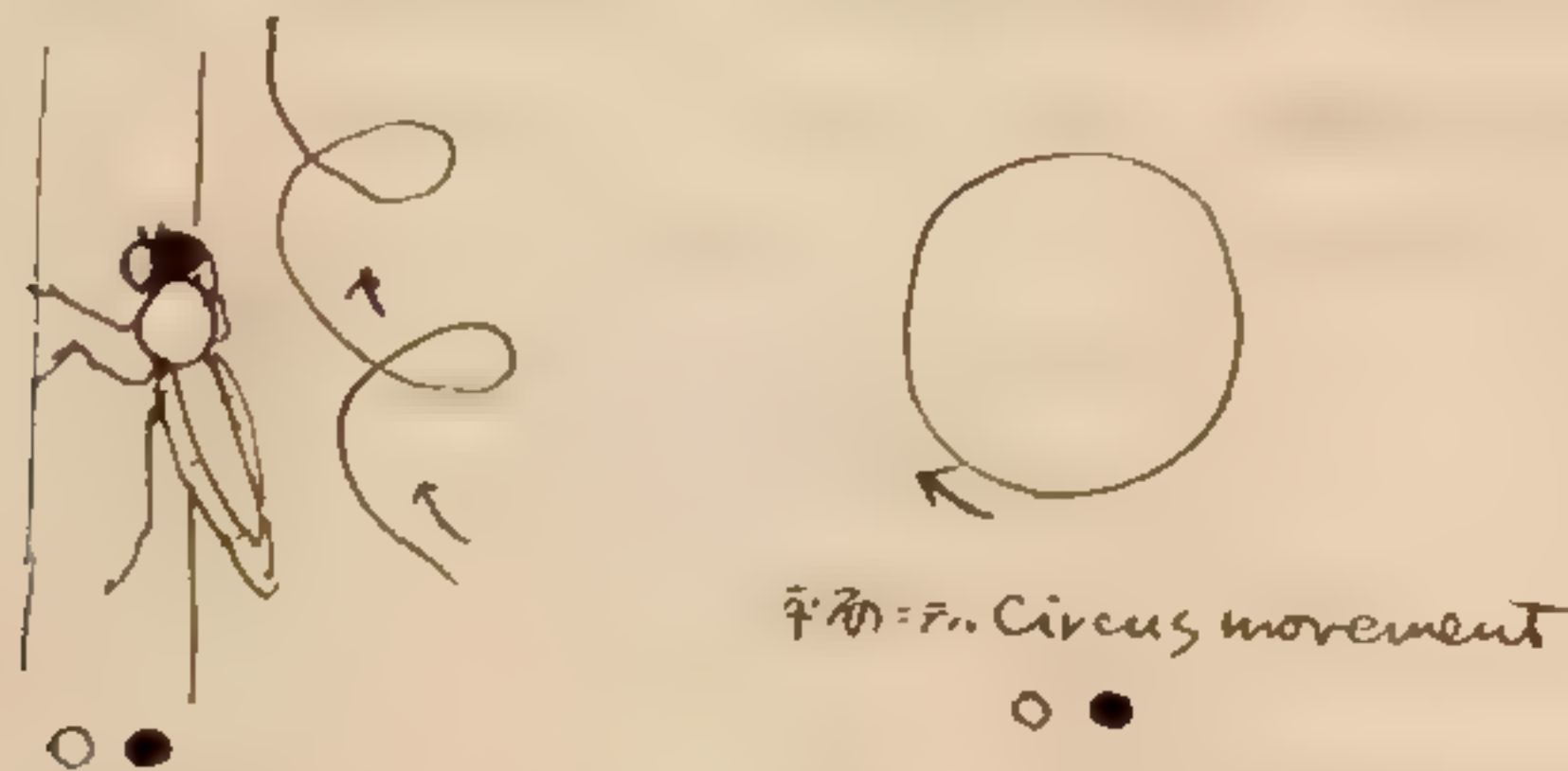
18. 植物は光に向かって Helio positive, negative 植物は光から離れて Helio negative
Holmes, 実験 植物 Ranatra. 植物は光に向かって motion 運動



Garrey, 実験 植物 Proctacanthos. 植物は光から離れて motion 運動



① 光の4つの photo sensitive + 10個のカラセンサー 2.5cm以内 = 375nm 720nm
photo positive + mechanism 7 P3.6.1.



2. Response to different spectral colors.

Marejkowsky: light quality = $\frac{2.2 \times 10^3}{3.2 \times 10^4} + 1$ b1E intensity = $\frac{2.2 \times 10^3}{3.2 \times 10^4} = 0.06875$

Hess, 昆虫の生態学, 人間, 動物の同定, 植物, 数値的, 1951

Gratacap, Plateau, Bulman, Bonnier. 昆虫色 = 317 花 = 7 4 5 6 + 1. 香 + 6 7 P 0 9.

gearkes. P_n is intensity of quality of x at p rpm

Bert, Lottrock, Graber, Loeb etc. \mathbb{R}^n , quality in $\mathbb{R}^n = \mathbb{R}^n - \mathbb{R}^n$

「また天ヲ呈礼. 又ラ・時ニモトハ 正月. 道有子ヲ用ヒテ. 此ノ色ハ免カレタリ」

= 3.44 $\times 10^{33}$ erg/s. Gross "1913" = ~~flat~~ spectrum \Rightarrow $\mu = 7$ \Rightarrow $\log L =$ luminosity

● 1. 超音波の強度 Intensity, 等価な実効の電圧, spectrum, 電圧のスペクトル

この部分、主として $\text{sensitivity} = \frac{1}{1 + \frac{1}{\text{SNR}}}$ である。SNR が高いと、 $\text{sensitivity} \rightarrow 1$ となる。

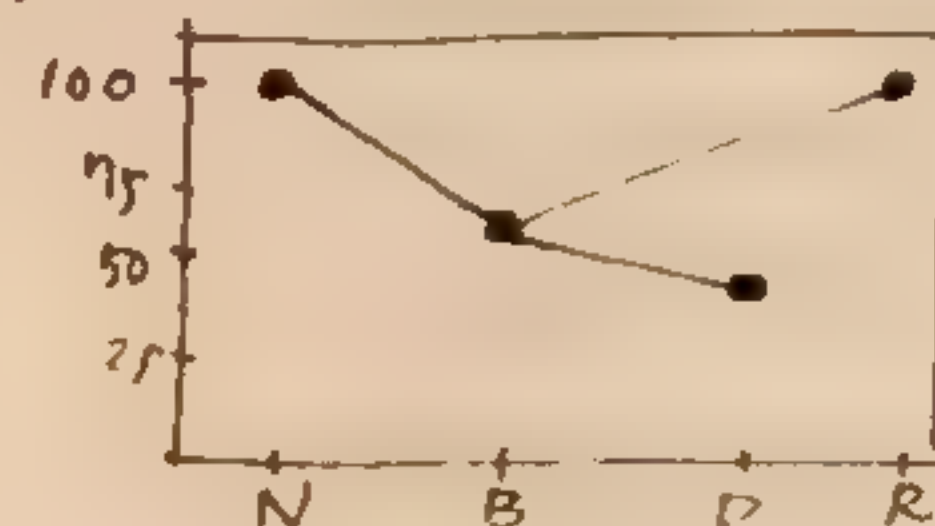
different stage \Rightarrow 4 6 7. refractive rays (波長, 色 (violet 紫色))

か一着新装が居た。云つた如く。 is 如く。 緑、青、

yellow, red 15% ~~15%~~ 15% 15%.

3 phototropism + metabolism / 同化作用 100% CO_2 , output 9

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N = normal
B = eyes blackened.

D = decapitation

1. 中 (部) の α と β の関係は $\alpha + \beta = 1$ である。
 2. α と β は $\alpha \geq 0, \beta \geq 0$ である。

R = Black removed

allee 走廊 to + my mayfly / nymph

恒压, 焓判据 7 用 ΔH reaction is reverse ΔH i.e. $+\rightarrow-$, $-\rightarrow+$

2011 又 毒藥: metabolism 1. 分解/名. metabolism, 2. 分解 毒藥 = 解毒

\dot{V}_{O_2} phototrophism reverse ~~flow~~, \dot{V}_{CO_2} $\frac{\text{g}}{\text{L}} \cdot \text{h}$ CO_2 output $\frac{\text{g}}{\text{L}} \cdot \text{h}$ metabolism

4. Light and Development. metabolism 1 (8) Photosynthesis 2

同条儿 299. 色, 10. 波号-27 号后, 移器机. 又松王古. 电尾1号+22.

彭亨+ larva 沢ノ、underハの寄集、中ニ附着ス Vanessa, arctia, Crateronyx.

red = *Vanessa* sp. = injurious

acceleration of development

Blue > yellow > dark violet > red > green (Schmajdsinowitch)

Violet > blue > red > white > green (Bécharde)

Violat > blue > red (so hoch)

violet > white > red (gal)

violet > > green.

pupa e c=37 影号カ467 arctia ~ violet ~ 日234E12411. Vanessa

ハク $\frac{3}{2}$ 277ハ 2 $\frac{1}{2}$ 45オマ。

adult diurnal insect = 日虫, kinectic & unvest.

nocturnal " 日中では活動せず 夜間は活動する

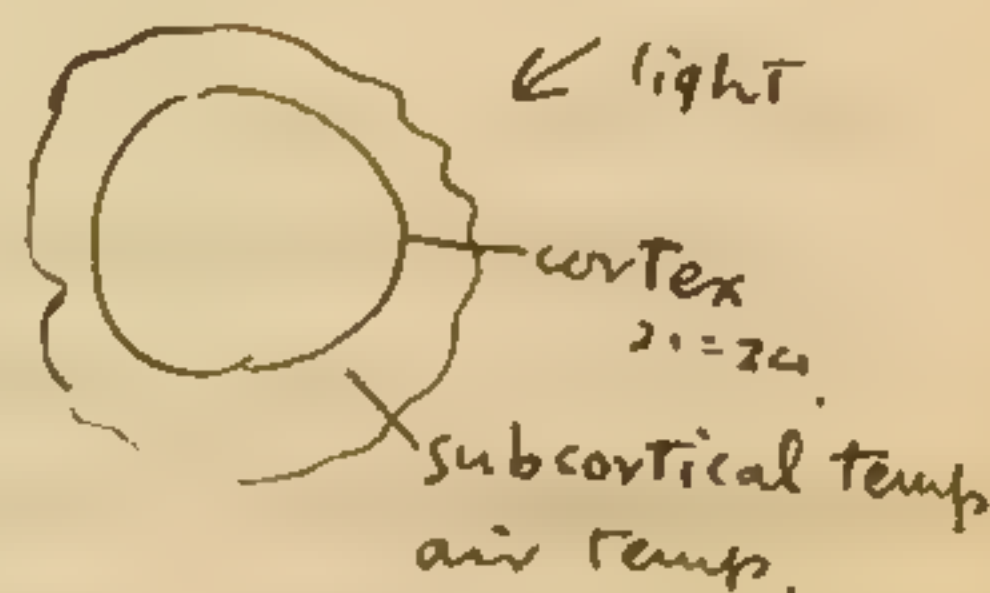
crepuscular twilight / トキでは 活動する

木の中, 地中, etc. 虫は暗い場所を好む 活動する

general conclusion

1. 昆虫の色は環境に依る。全体的な変化の stages = 変異
2. 昆虫の色は環境に依る。影響を受ける
3. 昆虫の absence & presence in species = 3 in injurious + economic significance.
4. 昆虫の活動, 化学的活性, order = 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000

light = 3m 直接 3m 間接 1m 森林 2m



虫は, RF = 昆虫, 日光 = 77.2% subcortical temp. = 30.2 Thermal effect / 1-100. 勿論 infra red, 40% 100% 虫は 77.2%.

又, 日光は 日光の通り 通過 77.2% 影響 77.2% 25% Halionegative insect, 50% 100%.

X-光線 radiant energy / 1-100. 放射線

害虫 = 及 昆虫の害, X光, toxin substance, 100% 100% metabolism

100% 100% metabolism, 100% 100% 100% 100%

100% 100% 100% 100% 100% 100% 100% 100% 100% 100%

egg = 100% 100% 100% 100% 100% 100% 100% 100% 100% 100%

100% 100% 100% 100% 100% 100% 100% 100% 100% 100%

応用. cigarette beetle = 100% 100% 100% 100% 100% 100%

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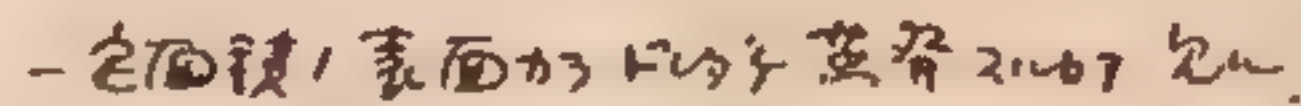
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生物學 ③

一、五〇四。

in water 7/10/7.

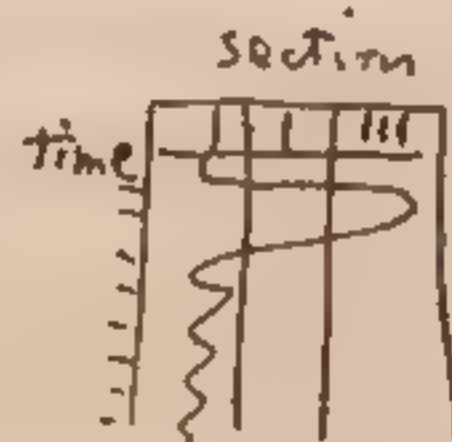


312 = 1700 24,

14. 研究 = 2415 "11系" (1)

2. 因 $\vec{a} \in \text{Symptom}$ 表示

inlets in gradients of



At 5:10 PM Time = 126

1. 2013-2014

[illegible]

adult.

adult.

1). caralidao / larva " evap. = $\frac{20}{100} = 20\%$ = sensitive, $\frac{45}{100} = 45\%$ = sensibility "

2) larva: dry air + high temp \rightarrow instantaneously - detect x.c.

4). evap. effect directly = $\frac{W}{h} (t_s - t_a)$ dry air $\frac{W}{h} = A \cdot \frac{W}{h} = \text{Temp.}$

生態的研究 = 之ヲ用ルル必要ヲ知ルル也 温度, 湿度, 空氣移動

(1) air temp., atmos. press, relative humid., average wind velocity,

(2) 同じ物 + factors が食物、体から $\frac{32}{9}$ の水分、 $\frac{1}{9}$ の法廷 $\frac{32}{9} + \frac{1}{9}$

15 10 09 44 — Reinhard

3. metabolism + 1. 同化 - 1. 异化作用 = 1. 同化作用 (homeio, or poikilo-
thermal organism = 变温), 1. 恒温动物, 1. 变温动物, 1. 恒温动物, 1. 变温动物.
environmental condition = 1. 环境, 1. 条件, 1. 环境.

a). moist, cold atmosphere (evap. ↑ + ↓) ∴ dry + 同化 / cold air 2つを1本に7に7 - 層 達 - 落下せぬ. + せ + 3 moist cold air / 7 + ∴ conduction = 37. 15 + 10 heat / 受が大きい. かん Temp, 135 F.

dry cold air $T_1 = 13^\circ\text{F}$, $P_1 = P_2 = 10$, heat conduction $T + u = 0$

8. 冰素 (penetral temp) 溫度 7.5℃ 冷空氣物環 溫度 (5+2+2)=9

moist warm atom. \therefore evap + penetrat cooling \approx 透蒸 = 1.7.7217

湿度高 / \rightarrow heatstroke \rightarrow 蒸気 normal limit temp & moisture 高 \rightarrow 早死 (lethal zone, ☹)

c) air movement — evap. & increase in body heat & insulation

\Rightarrow heat / radiation \nearrow increase evap. \nearrow body temp \nearrow / \searrow \nearrow \searrow

一走和血 \rightarrow 促血 \rightarrow metabolism \rightarrow increase \rightarrow 促血 \rightarrow 促血。

d) atom. press - 12 stat evap. heat radiation $1.7 = 1.75 \times 10^8$

從何物/何處/何處以 c) / 如 metabolism = 新陳代謝

evaporation, 7 出 67 243, 83 号 カ"1.5うん

4.) 生物体が水分を失うこと - evap. acc. - 生物の irritability activity, life history, 寿命 - 寿命の長短.

Jan. 15.

Section 6. Climate general conclusion.

climate, 气候. 气候的 = 天气. 气候. 研究天气 = 气象学. temperature, 温度.

insolation, air movement, atmosphere pressure & summer & winter.

か = total か climate 天気 気候 = 天 (参考 Bachmetjew 1907)

一般 = 平均。1. 是中心点 = 及不显著。2. 误差、环境及不显著。——全例

1. 質及量 = 200 食物中 plant root 3 + 2x + 1.

$$F = f_i + f_n + f_m \quad F = \text{force} \quad f_i \text{ is the force exerted by } i \text{ sp.}$$

环境因素 = 0.7 发电 transp.

$$f_{n_1} \text{ the } n_1 \text{ migrate } c_j t \rightarrow sp$$

$\underline{f}_n = f = f_n$ 上の関数が非零-多。 ω_n と $\nu = 1$ である。 ω_n は ν の

現在、 T_F : temp., humidity rate = 1, data 7 のデータに、sonarのデータを

• the climate, the $\frac{P}{E}$ ratio \rightarrow a. evaporation & $\frac{P}{E} = \frac{P}{E}$ (this is the)

• $\partial z +$ clinic factor $\Rightarrow \frac{2}{3} - 2$, combination $++ = \frac{10}{3} = 3\frac{1}{3}$

1512 975

2) metabolism, 代谢 = 反应速率, i.e. metabolic rate, 代谢率

1st acceleration + retardation. #153 in life cycle, → ...

4. 17. 1 stage of $\frac{1}{4}$ s. $\lambda_{11} = \lambda_{22} = 4$. 世代: $\lambda_{12} = 2$ 子孫: $\lambda_{21} = 2$.

2. metabolic rate: acceleration & retardation & hibernation

$$\therefore \text{activation} = \frac{2}{7} \times 25$$

3. metabolic rate, cessation $\frac{1}{4}$ t (mortality). 代谢率, 停止 $\frac{1}{4}$ t (死亡率).

以得

II). behavior = 22 7/8

1. 運動の開始 initiation 及停止 cessation

III). 生理的作用=及之影響.
physiological potencies

IV) 習性: 变化. migration, hibernation, food habit, nesting,
social life etc, 習性 = 習性習性. 習性 = 決定性 → 環境上 independent
= 決定性 環境 = 習性習性

v) physical character = 12 形 30. 形大 + . 包形 地地 1 号 = 12 形 30

VI) 地理的差 = 生態學的分布 = 及不顯著

Chapter V.

应用昆虫学, 重点31, 2, 主要+1, 4昆虫, 习性

附註一四　以昆山人書於上。而於其習性ヲ知ツテ之ヲ醫ハシメ、テ之ヲ治ス。

冬眠 - hibernation, 食性 - food habit, 迁徙 - migration, 超常丰度 - superabundance
拟态 - letisimilation 模拟死.

Section 1. Hibernation

昆虫: 体温 = 环境 - $\frac{1}{3}$. 变温动物: 外界; 恒温 = 内部 - 一定温度 (体内)
 i.e. Homoiothermic 恒温动物 i.e. Poikilothermic 变温动物
 外界: 温度相同 \rightarrow activity (活动) 时, 体温 = 环境温度. 静止时, 体温 \neq 环境温度. 冬季
 体温低于环境温度 \rightarrow 效果 \rightarrow alternatives 不同. 三: 77.

1. hibernation 2. migration 3. Amoria flexipes 182 +
 蜂. カダ' 北 ~ 北 ~ ト migrate : 7 1. トリ' 考, (4) ツマ' 147 (2). 3 = 2 + 1 -
 1. 5, generation. X 4. 277 蜂. 6 1. 1.

3. thermogenesis 温度の発生、作り出す。熱を又とって作る。現在 20

winter cluster 7+in. 花=...
 sphere = ...
 ...

[illegible]

休眠, Dormancy = 休眠. i 'fixed' dormancy. ii periodic dormancy. i 'fixed' dormancy .. life cycle $\phi = (1, 2, 2) - (2, 1) \phi$ 1 4, 1 3 + 1. ^{10/10} - 度 \neq 年, 2 度 \neq 2 年 egg \neq normal development \neq it is 1 3 7 11 (Eubranchipus)

periodic dormancy: daily + seasonal = 2 daily + 2 seasonal = 7 + 14 = 21
i diurnal ii nocturnal. = 23, 10 + 7. seasonal = 2
tagesschlaf nachtschlaf.

$\Rightarrow \frac{1}{2} = \frac{1}{2}$ winter, summer = 2 winter, 夏季, 夏季 = 2, summer
is destruction, 夏季 = 3/4

sleep. 寝る動物鳥乳種、爬虫類、魚、両生類、哺乳類、
~~sleep~~ = 睡眠、休息、
 low rate of metabolism. respiration quotient $\frac{CO_2}{O_2}$ 呼吸商。

circulation がオナ+ル。 sense organ がオナ functionless, body temp
低く。運動がオナ+ル。

argentine resin - $\frac{1}{2}$ photo reaction, thermo(~~temp~~⁺) reaction $\frac{1}{2}$ e

又右のト行方へは 空間移動が不便で危険. 温度+圧力 = energy

physiological reason — physiological reconstruction — waste
7 生理的 + 新的 energy 7 2 恢復 2 2 recuperation.

Hibernation (Winterschlaf, winterruhe, Überwinterung)

Def. 休眠動物 = characteristic + periodic Dormancy,
 一ツ、torpid = 眠る 或は、冬、休 + 季節の保護 + 或は、secluded
 かつ + 眠る = non-feeding; 又 in active + torpid condition
 = 休眠状態である。

1832

hibernation 冬眠. i. 季節. 冬. 或. 冬. 和. 季節. 冬
場. 冬. 冬. 冬. ii. secluded place. iii. condition, coexistent,
食物. 冬. 冬. 冬. iv. 食物. 冬. 冬. 冬.

昆虫界 = 物种的生态, prevalence; 生态学, 昆虫生态学.
 生态. i True hibernation. 生态学 = 生态 + 生态学.
 生态学, 生态学, 生态学 = 一定, 生态学. 生态学, 生态学.
 modify 生态学, 生态学 = 生态学 eliminate 生态学

ii Facultative hibernation ('urochite'). 冬眠 2, 4 月.
periodical 3x: 冬眠 2, 4 月 = 3x 2 月.

iii non-hibernation honey-bee 100% inactive 100%
非冬眠蜂 100% 不活动 100%

hibernation + life history stages 11/21/74 K14. 生活史 + life history
1 生活史 stage = 生活史の4つの段階を扱う。

Werneburg = 2.11.11

Ei	3.4%
Raupe	66.9%
Puppe	28.2%
Imago	1.5%


299acridal 100% Raupé

Sphingidae 75% + pupae

Tagalter	%	als Ei
	9 %	als Ei
	54 %	" Raupe
	28 %	" Puppe
	9 %	" Imago

* chelico domo

[illegible]

 + Imago • puppa - larva • egg.

2. hibernation stage, variation. 世代の第1年 = 731221. 122711

[illegible]

$\frac{d}{dt} \left(\frac{1}{2} m v^2 \right) = \frac{1}{2} m \frac{dv^2}{dt}$

[illegible]

hibernating stage = 12% of hypothesis - food habit = 12% of 11.6% =

例年2011. 春苗会 + food host = 670 + 1200 = 1870. 去来 + 1400 = 3270. 成虫 = 3270.

2. 秋特異 / 1880年 - 1912年 - 阿拉伯語. Related day 7 = 食力 7 + 1 + 1 + 1 + 1.

larva? 3 pupha 2 egg + 2 larva 3 pupha 2 egg, stage 6 to resistance
7 to 20 h + 1 h.

Schoenichen, 26. 9. 10. 27. pubha 7 1/2 mit 4. 7. 9.

hahaha = cocoon = 蚕茧 2 45' 果 1/2 = 桃子 水果的 2/3 = Weiss

1914 年 1 月 13 日。1. cocoon 中, 温度, 外界, 温度, 同一, 温度 = 21.5°C. 2. 温度, protection 温度. 3. 温度, 温度 = 18°C. 温度 + 温度 = cocoon, 中 = 21.5°C. gradually - 温度. 4. moisture = 湿度, 湿度, 湿度 = 21.5°C. (湿度, 湿度 = 湿度, 湿度 + 湿度) 湿度, 湿度 = 21.5°C. 湿度, 湿度 = 21.5°C.

[illegible]

in the lepidoptera.. winter nest = 170.07 " / P = 1.1752. 10.20

III. Hibernation = 先 $\frac{1}{2}$ 口 経 節. 用 意. Pre-oviposition stage = $P^{11/7}$.

Xu 71 = \Rightarrow \exists D non-feeding stage n'su. Behavior, $\frac{1}{2}$ fin. modification

- tropism, reversal $\frac{1}{2}$ in 24 h; tol (Coccinellid beetles) "

⑥ $\frac{B}{P}$ isolated + 4⁺ $\frac{B}{P}$ 2u + 1n gregarious = + 1n. Codling moth $\frac{B}{P}$

しみじみした 1. 経験, 3つ(feeding stage) 1. photonegative 77

156 是 '2' 2 个 #11 photopositive = +11. #5 = geopositive +11. coloradopotato

beetles + many lepidopteran larvae - feeding 1st = "photopositive + 1st"

21 + 2/3 photogeture + 11. 62 + species 71. hibernation quarters

= 175 migration P9.

→ IV. Entrance of hibernation

V. Emergence from hibernation
2 E-171 period 7.11. emergence rate = 3/3 climatic factor = 1.00 + 1.00

Brown-tail moth, larva, 1st instar, 34° F 12 h, Temp. 1st instar

1. 27. 22. cottonball weevil 71. 20. 65°F 77u.

periodic 定期的 多ク、temp. 数回。数回同入ル=要ス cotton ball
weevil. Temp. 1度下ヲ入ル=要ス。其の回数短シ。 period of hibernation

"7, 8, 9 A 245, 6, A 27" 7/11 2-3 4/10. 2 species - 21 67.

V. Seasonal difference. 3rd insects 7th ♀♂ 共 = 28ト 数
♀ 3トキハ又 6カ多イ。 (larva: cotton ball beetle) ♀ = 1月ルニ social
hymenoptera. 8月秋交尾して子にガ queen に成つて居る。 3rd
aphis 7th ♀ egg に成りたる。

iii. survival rate.

i) sex = 2, mortality rate in hlb. is $\frac{1}{2}$. 20 species fit the formula $\bar{n} = \frac{1}{1 - \frac{1}{2}}$

ii) life stages = 4 stages. cotton boll weevil = i. adult, pupa & pupa = 2 larvae = 1836741.

iii) shelter, 住所 + efficiency.

(i) climatic factor. 2011 必记非常 = 1521 零 4 = 1.3 32 =
fractionation $8'' \approx 9 + 1$.

v) Parasite — dependant to climatic factor indirectly.

VIII. Physiology of Hibernation.

Tower, W. L. 1906. Carnegie Institute Pub. no. 48.

Breitenbacher, J. K. 1918. " " no. 263.

Tower (1906), 材料 Leptinotarsa decemlineata の卵の孵化と成長

- (i). fat body = reserve food material & reserve etc.
- (ii) cessation of feeding
- (iii) defecation of ? in alimentary canal. (食物がとれる)
- (iv) malpighian tubule to excrete etc.
- (v) body weight of 2nd instar = 30% of 1st instar. 中 27% water, 3% excretion
- (vi) cytological change - 1st instar to 2nd instar. dense protoplasm - high granular + colloidal state etc. appearance - cell 42% of 1st instar. nucleus - vegetative chromatin etc. etc. etc. 2nd instar 7th day of 1st instar etc. etc.
- (vii) behavior modification. geophilic, photonegative.
- (viii) heette, 1st instar to 2nd instar, etc. etc. etc. - low rate of metabolism etc. etc. etc.

一般: 体定減少. 低漏=対に振れ方増し. waste productより除. excretory
加, 行いし外王 喜+キヨ=24.

Tower (1906). emerge at immediately = malpighian tubule = excrete i. voracious % of water cytological change active state = protoplasm watery vacuolated cell turgid chromatin great activity entrance reversal

ト 25 cm.

Breitenbacher (1918). water relation \rightarrow 45 = 3升 $\frac{1}{2}$ 水. \rightarrow 1/5 果. Tower
study \rightarrow 实验 = 4升 environment, influence \rightarrow 5升.

i) soil moisture & duration of hibernation & control ex. i.e.
 $P_{21} = 15.117$ soil moisture & $t_2 = 2$ at hygroscopic water & absorption
 at hibernation & 15.117 ex.

ii) behavior, change μ , i.e. soil = 1K7 041146 1K7 0242 3111
beetle, photopositive, geonegative etc.

iii) $\lambda_{ut} \neq 1$, food λ_{ut} is a fair factor $\neq 1$ low Temp. $\neq 1$ low humidity $\neq 1$ $\neq 1$ controlling factor $\neq 1$ $\neq 1$.

高 hereditary factor 高 environmental factor 120187u
 217 Toner 1906 = 高. 1913 02 03 高 = 'low temp & low humidity
+ Heredity' 121074u.

Literature: Rasmussen, A.T. 1916. Amer. Naturalist. L: 607-625.

destitution

Summer or summer like season = 27m. a form of dormancy
 7" 34. = Tropic or subtropical region = 7m species, 4特存, 2177m.

duration .. seasonal (E). — *Leptinotarsa* 17.11.11. — 7. 11. 11.

Temporary + π 1 — subtropical or temperate zone =

517 夏1第1回。 daily = .

True desertation, 4432. Leptinotarsa spp. — hot & dry season;
subtropical — dry but cold. 南米, 中美, high plateau 区, 旱, 炎热, 冷.

1412 — dryness.

physiological = hibernation = 2 is.

(i) food material storage in fat body.

(ii) alimentary canal 消化管. 口腔, 咽, 食道, 胃, 十二指肠, 小肠, 大肠, 肛门

(iii') reduction of water content

(iv) soil moisture = 0.4 control + 0.6 t.u. (moisture \rightarrow absorb \rightarrow restoration of water content \rightarrow i.e. \rightarrow)

(v) heredity as factor plays. i.e. 'heredity, low humidity and high temperature (less effective)' spm.

economic significance.

(i) ~~the~~ suspension & termination of injuries.

(ii) 駁降 = + - 7 critical period = P_{in} . environment, adversal insect, insensitive, 更 = condition 7 更 5 20 = 39 之 7 10 2. 21 P# = 又 natural enemy, 18 子現 = 壁 7 P_{in} . (winter quarter = P_{in} 62, 平第 21 有 20 = 改型 18)

(iii) hibernation, 研究 = 24 年, 研究, 模拟 \rightarrow predict 出来。
(致死 mortality \rightarrow 100% = 01). — successive hibernation.
great danger \rightarrow 危险。

hibernation survey 7 30 2020 to 10/10/2020.

literature: Hinds & Gothers — Hibernation of Mexican cotton
ball weevil, 1909. U.S.D.A. Bull. 77.

五

大tp+理由: 需, 25%以上, 1元1' 食性+1' 第Pb(1)+9.

1. Phytophagus --- Vegetarian, herbivora.

after Weiss & Brues. (- 512 E - 1717)

1. 50.2% 12 L. phytophagous 5" 267347

2. Anthophila

2. *Sacrophaga* ... *carnivora*.

2. Entomophaga (parasite, internal)

3. Epizotic (parasite, external)

3. saprophaga ... scavenger

1. microphaga microscopic organism

2. mycetophaga fungi

3. Necrophaga corpse.

4. *Coprophaga* 糞

4. pantophaga ... omnivora 雜食

* 1 phytophagous proper 7 2 = 3115 ut

1. polyphaga ... indiscriminatory = 何でも食う

2. oligophaga... several related ssp. fixed.

3. monophaga ... one sp. definite.

(2). food material.

食料 $2 \in 1, n+1$. 12 mineral = 217, 709, 710.

16

a. bacteria b. fungi c. lichens d. mosses. e. ferns.

f) Flowering plants — every parts (xylem, secretion-nectar, sap etc, ~~the~~ fruit, seed, root, ball, forage, flower-anther, ovary) and every species.

2. animal food.

i predator. insects - { other species ... carnivorous
self sp. ... cannibalistic.

worms (lumbricus), mollusca (Luciola vitticollis)

14/17 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78. 79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94. 95. 96. 97. 98. 99. 100. 101. 102. 103. 104. 105. 106. 107. 108. 109. 110. 111. 112. 113. 114. 115. 116. 117. 118. 119. 120. 121. 122. 123. 124. 125. 126. 127. 128. 129. 130. 131. 132. 133. 134. 135. 136. 137. 138. 139. 140. 141. 142. 143. 144. 145. 146. 147. 148. 149. 150. 151. 152. 153. 154. 155. 156. 157. 158. 159. 160. 161. 162. 163. 164. 165. 166. 167. 168. 169. 170. 171. 172. 173. 174. 175. 176. 177. 178. 179. 180. 181. 182. 183. 184. 185. 186. 187. 188. 189. 190. 191. 192. 193. 194. 195. 196. 197. 198. 199. 200. 201. 202. 203. 204. 205. 206. 207. 208. 209. 210. 211. 212. 213. 214. 215. 216. 217. 218. 219. 220. 221. 222. 223. 224. 225. 226. 227. 228. 229. 230. 231. 232. 233. 234. 235. 236. 237. 238. 239. 240. 241. 242. 243. 244. 245. 246. 247. 248. 249. 250. 251. 252. 253. 254. 255. 256. 257. 258. 259. 260. 261. 262. 263. 264. 265. 266. 267. 268. 269. 270. 271. 272. 273. 274. 275. 276. 277. 278. 279. 280. 281. 282. 283. 284. 285. 286. 287. 288. 289. 290. 291. 292. 293. 294. 295. 296. 297. 298. 299. 300. 301. 302. 303. 304. 305. 306. 307. 308. 309. 310. 311. 312. 313. 314. 315. 316. 317. 318. 319. 320. 321. 322. 323. 324. 325. 326. 327. 328. 329. 330. 331. 332. 333. 334. 335. 336. 337. 338. 339. 340. 341. 342. 343. 344. 345. 346. 347. 348. 349. 350. 351. 352. 353. 354. 355. 356. 357. 358. 359. 360. 361. 362. 363. 364. 365. 366. 367. 368. 369. 370. 371. 372. 373. 374. 375. 376. 377. 378. 379. 380. 381. 382. 383. 384. 385. 386. 387. 388. 389. 390. 391. 392. 393. 394. 395. 396. 397. 398. 399. 400. 401. 402. 403. 404. 405. 406. 407. 408. 409. 410. 411. 412. 413. 414. 415. 416. 417. 418. 419. 420. 421. 422. 423. 424. 425. 426. 427. 428. 429. 430. 431. 432. 433. 434. 435. 436. 437. 438. 439. 440. 441. 442. 443. 444. 445. 446. 447. 448. 449. 450. 451. 452. 453. 454. 455. 456. 457. 458. 459. 460. 461. 462. 463. 464. 465. 466. 467. 468. 469. 470. 471. 472. 473. 474. 475. 476. 477. 478. 479. 480. 481. 482. 483. 484. 485. 486. 487. 488. 489. 490. 491. 492. 493. 494. 495. 496. 497. 498. 499. 500. 501. 502. 503. 504. 505. 506. 507. 508. 509. 510. 511. 512. 513. 514. 515. 516. 517. 518. 519. 520. 521. 522. 523. 524. 525. 526. 527. 528. 529. 530. 531. 532. 533. 534. 535. 536. 537. 538. 539. 540. 541. 542. 543. 544. 545. 546. 547. 548. 549. 550. 551. 552. 553. 554. 555. 556. 557. 558. 559. 560. 561. 562. 563. 564. 565. 566. 567. 568. 569. 570. 571. 572. 573. 574. 575. 576. 577. 578. 579. 580. 581. 582. 583. 584. 585. 586. 587. 588. 589. 590. 591. 592. 593. 594. 595. 596. 597. 598. 599. 600. 601. 602. 603. 604. 605. 606. 607. 608. 609. 610. 611. 612. 613. 614. 615. 616. 617. 618. 619. 620. 621. 622. 623. 624. 625. 626. 627. 628. 629. 630. 631. 632. 633. 634. 635. 636. 637. 638. 639. 640. 641. 642. 643. 644. 645. 646. 647. 648. 649. 650. 651. 652. 653. 654. 655. 656. 657. 658. 659. 660. 661. 662. 663. 664. 665. 666. 667. 668. 669. 670. 671. 672. 673. 674. 675. 676. 677. 678. 679. 680. 681. 682. 683. 684. 685. 686. 687. 688. 689. 690. 691. 692. 693. 694. 695. 696. 697. 698. 699. 700. 701. 702. 703. 704. 705. 706. 707. 708. 709. 710. 711. 712. 713. 714. 715. 716. 717. 718. 719. 720. 721. 722. 723. 724. 725. 726. 727. 728. 729. 730. 731. 732. 733. 734. 735. 736. 737. 738. 739. 740. 741. 742. 743. 744. 745. 746. 747. 748. 749. 750. 751. 752. 753. 754. 755. 756. 757. 758. 759. 760. 761. 762. 763. 764. 765. 766. 767. 768. 769. 770. 771. 772. 773. 774. 775. 776. 777. 778. 779. 780. 781. 782. 783. 784. 785. 786. 787. 788. 789. 790. 791. 792. 793. 794. 795. 796. 797. 798. 799. 800. 801. 802. 803. 804. 805. 806. 807. 808. 809. 810. 811. 812. 813. 814. 815. 816. 817. 818. 819. 820. 821. 822. 823. 824. 825. 826. 827. 828. 829. 830. 831. 832. 833. 834. 835. 836. 837. 838. 839. 840. 841. 842. 843. 844. 845. 846. 847. 848. 849. 850. 8

ii parasite (internal) - other insect. (기생, 내부 기생) parasite 72.7. 12 - same sp. 7 $\frac{3}{4}$ 72.7. 12. other arthropoda, worms (earthworm 7 Pollenia rudis - Diptera, Muscoidea), Fish (Ephydrinae - small fly, larva). Birds, mammals (myosis 7 72.7. 22 $\frac{3}{4}$ 72.7. 12. 기생, 내부 기생)

iii external parasite — mammals (9x, 13x, etc), birds (mallophaga)

3 Saprothaga — carrion beetle (silphidae)

4. Excretions — copris (Tumble beetle), social insect, trophallaxis.
beetle moth

5 Secretions — Aphid.

6. Wool, fur - cloth moth, $\lambda \rightarrow \text{E. B. L. L. L.}$

(3) Taxonomical group = 17. (food habit of insect order).

- | | |
|------------------------------|---|
| 1. Thysanura | scavenger — Lepisma (carnivora, cannibal) |
| 2. Collembora | phytophaga — mushroom, vegetable, 菌類等 |
| 3. Orthoptera | " — omnivora, carnivora (mantis) |
| 4. Plecoptera | carnivora — phytophaga (Taeniopteryx, larva) |
| 5. Euplexoptera | anthophila, scavenger, predaceous. |
| 6. Isoptera | Phytophaga, scavenger (spoiled wood) |
| 7. Embiidia | Scavenger? |
| 8. Corrodentia | Scavenger, phytophaga, omnivora. |
| 9. Mallophaga | scavenger — Epizoid |
| 10. Odonata | Carnivora |
| 11. Ephemera | Phytophaga — carnivora (Chironomus, larva) |
| 12. Thysan ^{optera} | " , Anthophila, Carnivora |
| 13. Heteroptera | phytophaga (majority), carnivora, epizoid (+) |
| 14. Homoptera | phytophaga |
| 15. Anoplura | Epizoid (blood sucking) |
| 16. Coleoptera | phytophaga, scavenger, predator |
| 17. Neuroptera | predaceous |
| 18. Trichoptera | scavenger, herbivora |
| 19. Hymenoptera | phytophaga, predator, parasite, omnivora |
| 20. Strepsiptera | parasite to bee |
| 21. Mecoptera | Herbivora — Boreus (moss), Bittacus (predac) |
| 22. Lepidoptera | phytophaga, scavenger, predator — parasit |
| 23. Siphonaptera | epizoid (カゲキ) |
| 24. Diptera | phytophaga, scavenger, parasite, predator (カゲキ) |

Lepidoptera. Brues T.C. 1920 Amer. Naturalist 54: 314-332.

(4) Qualities of Foods.

Protein, Carbohydrate, fat, salt; Vitamins 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.